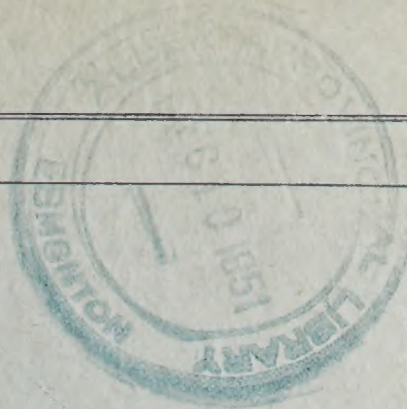


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Dec 6/51
Vol 29



The Province of Alberta

PETROLEUM AND NATURAL GAS CONSERVATION
BOARD

IN THE MATTER OF THE GAS RESOURCES PRESERVATION ACT

AND IN THE MATTER of a Joint Hearing to determine various questions
relating to the proposed Export of Natural Gas from the Province of Alberta.

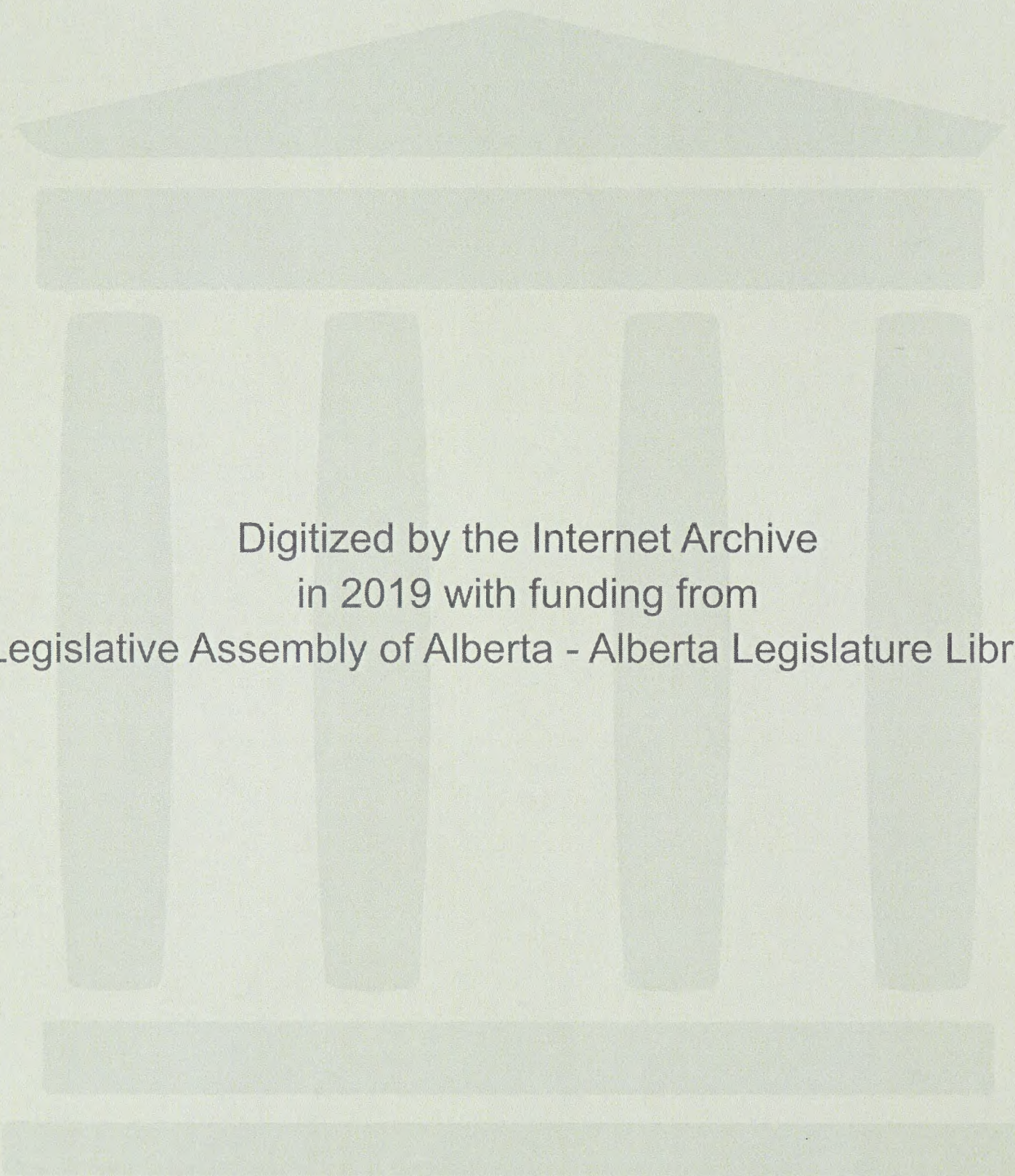
I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

Session: December 6th, 1951.

Volume 29.



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VOLUME 29.

December 5th, 1951.

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Exam. by Mr. C.E. Smith.

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D. S. DUNKLEY (recalled)

already sworn, -

THE CHAIRMAN:

Does anyone wish to question

Mr. Dunkley?

MR. C.E. SMITH:

I have a few questions. I

do not know whether other counsel have anything or not.

For a change, I will lead off to get things under way.

THE CHAIRMAN:

Mr. McDonald, do you wish

to examine Mr. Dunkley at all?

MR. McDONALD:

No, I do not, sir.

THE CHAIRMAN:

All right, Mr. Smith.

EXAMINATION BY MR. C.E. SMITH:

MR. SMITH:

I think for the sake of the

reporter I had better move down here.

Q Mr. Dunkley, at the outset, I draw your attention to what appears to be a typographical error on page 2 of your text, and I refer to the paragraph headed "Commitments to Northwest Natural Gas Company".

A Yes, sir.

Q The last line, fourth year, you have 25,000 MMcf.?

A Yes.

Q Undoubtedly one "M" should be deleted?

A That is correct, sir.

Q I have corrected it in my own already. I presume the

Exam. by Mr. O.E. Sander.
Re. F. F. F. F. F.

Witness:
O. E. Sander, 1981.

In the presence of:

already exists.

THE CHAIRMAN: I have the question. I do not know whether there is any other way. I will leave it to the witness. THE CHAIRMAN: to examine the witness at this time. THE CHAIRMAN: All right, Mr. Sander.

EXAMINATION BY MR. O.E. SANDER:

Q. I look for the rest of the report. I had better give you some. I am not sure of the content. I have your attention to what appears to be a hypothesis. I have a page 2 of your report, and I believe the paragraph headed "Conclusions" mentions "Company".

A. Yes, sir.

Q. The last line, "Conclusions", we have 25,000 units.

A. Yes.

Q. I believe the paragraph headed "Conclusions" mentions "Company".

A. Yes, sir.

D. S. Dunkley,
Exam. by Mr. C.E. Smith.

- 2584 -

others have done the same thing. Referring to the first page of your text, Mr. Dunkley, and with a bit of fear and trembling, I refer you to two words, "proven" and "probable".

MR. NOLAN: Oh, no.

MR. C.E. SMITH: I expected that.

Q Can you assist the Board in as briefly as possible explaining how you distinguish the meaning of the two words, Mr. Dunkley?

A We define the proven reserves as reserves which have been established by formation tests in the various formations in wells or which lie structurally high enough to contain gas in an area very close to or adjacent to the wells. Probable reserves are reserves which we feel can be reasonably expected because of the structural position of the pay zone under consideration.

Q And what data or control do you have with respect to each of them?

A We have a considerable amount of information in southeastern Alberta. I think I can say that the California Standard Company has done more exploration and drilled more wells in southeastern Alberta than any other one company. We also have a considerable amount of seismic information and structure test hole information.

Q And test hole information?

A Structure test hole information. We drilled structure test holes to get an idea of the structure further down.

Q Anything else you want to add, Mr. Dunkley?

A No, sir.

Q Personally, I sometimes feel I would like to let the two

W. S. D. ...
Exhibit ...

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others have done some thing ...
page of your text ...
travelling ...

MR. ...
OF ...

MR. C. E. SMITH: I expected that ...

Q Can you assist the Board in as briefly as possible explain-
ing how you distinguished the meaning of the two words ...
Doubtless?

A We define the proven reserves as reserves which have been
estimated by formation tests in the wells ...
in wells or which the geologically high enough to contain
gas in an area very close to or adjacent to the well.

Probable reserves are reserves which we feel would be recover-
ably expected because of the structural position of the gas ...
some other consideration.

Q And what data or control do you have with regard to ...
of these?

A We have a considerable amount of information in ...
eastern Alberta. I think I can say that the ...
Standard Company has done more exploration and ...
some wells in southern Alberta than any other ...
company. We also have considerable amount of ...
information and evidence that this information.

Q And what data or information ...
A Information is information. We drilled ...
test holes to get an idea of the ...
Q And what data or information ...

A ...
Q ...

D. S. Dunkley,
Exam. by Mr. C.E. Smith.

- 2585 -

words stand by themselves and probably get as fair an idea. Referring, then, to the fifth paragraph headed, "Gross Thickness and Effective Thickness", and the last sentence there, "an effective thickness factor varying between 50 and 75 per cent was then applied to obtain effective acre feet". Having regard to your application of a factor between 50 and 75 per cent, would you elaborate a bit on that, Mr. Dunkley?

A This applies to different zones. What I did was to take the core descriptions or the electrologs of each well drilled in the particular zone that I was considering. I took the over-all thickness, I went through the core descriptions or the electrologs and threw out what I considered was non-effective, did this with several wells and added them up, divided the effective thickness by the total over-all thickness and I arrived at this effective thickness factor.

Q Then, if I understand you correctly, the factor varying between 50 and 75 per cent being then applied to obtain effective acre feet. It is not some sort of judgment figure at all?

A No, I do not think so, sir. It varied for different formations.

Q Let us take Princess, the first one there, Princess-Sunburst, and take area 1, for instance. If my mathematics are anywhere near correct, you have an effective thickness there of 12 feet, without any decimal arrangement?

A Yes, sir.

Q Perhaps you could tell us how you arrived at that figure?

- 2585 -

would stand by themselves and probably get as fair an idea.

Referring, then, to the fifth paragraph headed, "Cross
Thickness and Effective Thickness", and the last sentence

there, "an effective thickness factor varying between 50
and 75 per cent was then applied to obtain effective area

factor". Having regard to your application of a factor

between 50 and 75 per cent, would you elaborate a bit on

this, Mr. Dunkley?

This applies to different cases. When I did was to take

the core descriptions of the effectiveness of each well

listed in the particular zone that I was considering.

I took the over-all thickness, I went through the zone

descriptions of the effectiveness and there was what I

considered as non-effective, did this with several wells

and added them up, divided the effective thickness by the

total over-all thickness and I arrived at this effective

thickness factor.

Then, if I understand you correctly, the factor varying

between 50 and 75 per cent being then applied to obtain

effective area factor. It is not some sort of judgment

figure at all?

No, I do not think so, sir. It varied for different

formations.

Let us take Folsom, the first one there, Folsom-8-2-

1917, and take area 1, for instance. If my explanation

and answers were correct, you have an effective thickness

there of 12 feet, without any special arrangement?

Yes, sir.

Perhaps you could tell us how you arrived at that figure?

D. S. Dunkley,
Exam. by Mr. C.E. Smith.

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A I can not exactly remember my figures that I used on that, but area 1, if we refer to the map of the Sunburst, would include wells C.P.R. No. 6, 18-21-A, 78-22, and so on as outlined in that order. A lot of those wells were cored in the Sunburst. We also electrologged several of them and the core descriptions were read over. Any zone which had shale in it or was described as "tight", it was thrown out, and all these footages that were thrown out were added and taken away from the total over-all thickness of each well.

Q Well, then, we can not take, say, this 12 feet exactly for purposes of discussion?

A Yes.

Q We can not take that and say that is 50 per cent or 75 per cent of what you found to be gross thickness?

A If I remember correctly, I think the Sunburst was 60 per cent effective. Therefore, if you go ahead and divide the 12 feet by .6 you come out with an over-all average thickness.

Q Well, in that case, you would be taking about 60 per cent as your factor?

A That is right, sir.

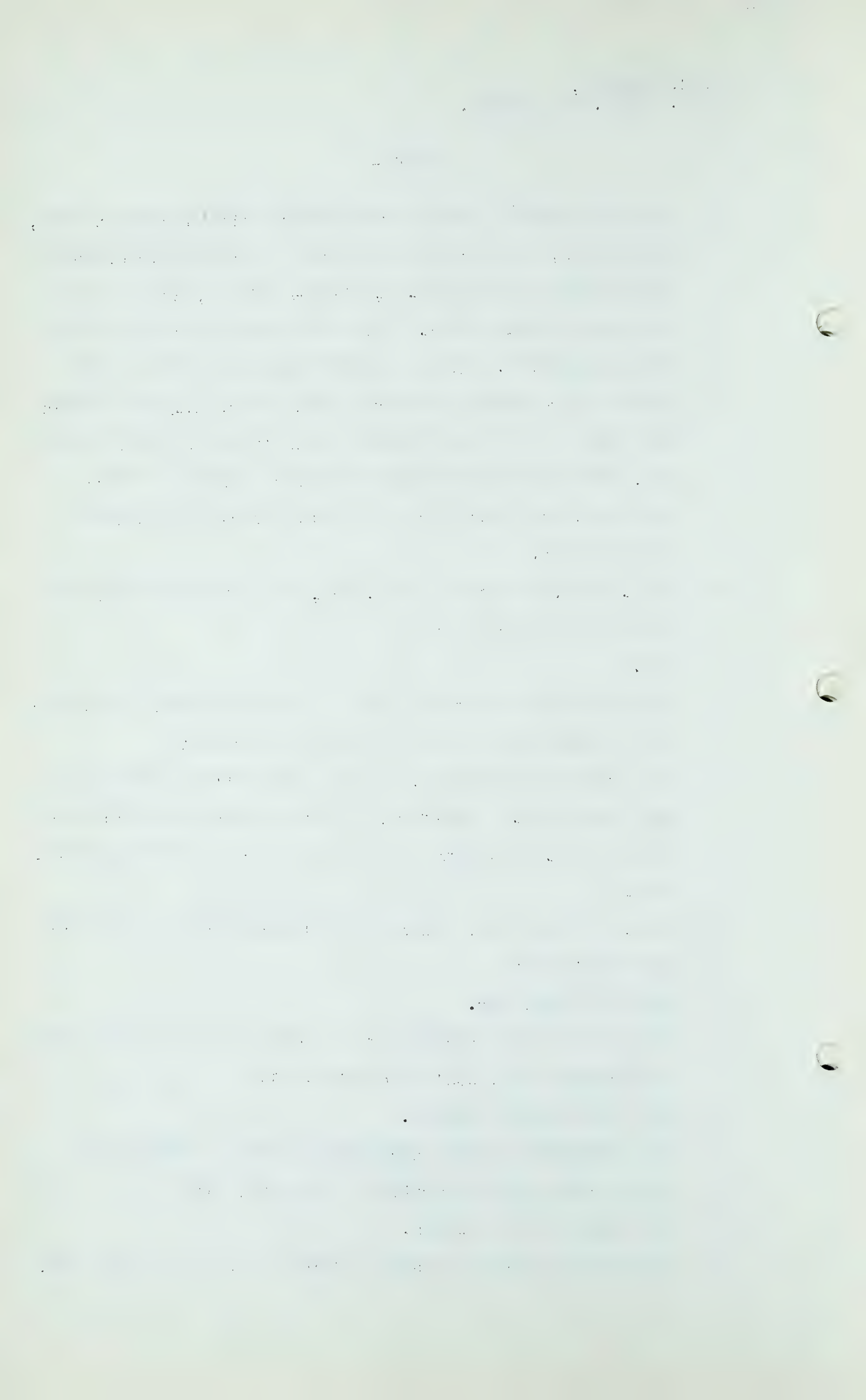
Q Would you do that because of information you got from your electrologs and I don't know what-all?

A Core descriptions mainly.

Q You ascertain a gross thickness and then it ends up at 60 per cent when you arrive at your 12 feet?

A The sum of all the wells.

Q Referring to where we apply a factor of 50 to 75 per cent,



D. S. Dunkley,
Exam. by Mr. C.E. Smith.

- 2587 -

what you mean is, from all the data you have it results in some figure between 50 and 75 per cent, is that correct?

A Yes, sir. 50 and 75 per cent was a general statement as to the effective thickness factor, the extremes of the effective thickness factor between different zones.

Q That is simply a range you found?

A For one zone it would have the same effective thickness factor, like that Sunburst at Princess would be 60 per cent, the Ellis at Dunmore would be 75 per cent.

Q And Sunburst in your other areas, area 2, 13-- , area 3, 10, is that correct?

A Yes.

Q The same type of ascertainment is applied in all of those three areas?

A Yes.

Q And it comes out to about 60 per cent, is that what you mean?

A That is right, sir.

Q Of the gross thickness. Now, will you turn to page 2, Mr. Dunkley, and it is the second page, in any event, of your text.

A Yes.

Q And the paragraph beginning:

"During the first year, the bulk of the gas committed would be supplied from the Sunburst and Basal Colorado zones. This would require eight wells from the Basal Colorado and seven wells from the Sunburst. There are at present enough suspended gas wells in the Princess

D. S. Dunkley,
Exam. by Mr. C.E. Smith.

- 2588 -

"area to meet this requirement."

My mathematics being any good again, 7 and 8 means 15.

What I want to ask you, are there 15 suspended gas wells in those two formations?

A No, sir. Seven of those wells would be dual completions, the eighth one would be a single completion.

Q Well, with respect to the total 15, is there any method whereby you could let us have a list of the 15 showing which are dual and the position they are in, you might say?

A Yes, sir. Princess C.P.R. No. 7 has got 7-inch casing in the hole right to the Sunburst. We could go ahead and re-work the Sunburst.

Q Possibly to save time, would it be too much trouble to prepare a list of the 15 with the information you have just given?

A There are not 15 wells. There are only 8 wells considered altogether.

Q Oh, I see, 8 wells and 7 dual completions?

A Yes.

Q I wonder if it would be too much trouble to give us a list showing exactly what the information is?

A I have a list right here. In Princess C.P.R. No. 1 there is 7-inch casing to 3400 feet; Princess C.P.R. No. 6 has 7-inch casing to 3185; at 16-22-A there is 7-inch casing at 4,067; 18-22-A has 7-inch casing at 3951; 76-23-A has 7-inch casing at 3227; C.P.R. No. 3, 7-inch casing at 3230; C.P.R. No. 2, 7-inch casing at 3220; Standard-McDougall-Segur 7-inch at 3270; C.P.R. No. 1 has 7-inch to 5520; California Standard 64-8-19-11 there is 7-inch

D. S. Dunkley,
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- 2589 -

at 3430; Dunmore 65-5-11-4, there is 7-inch at 3363; and Dunmore 33-2-11-5, there is 7-inch at 3304.

Q All right. The first 7 of those are dual completions?

A What I consider would be dual completions would be C.P.R. No. 6, 16-22-A, 76-23-A, C.P.R. No. 3, Standard-McDougall-Segur No. 1. You also have a well that we have now suspended, 18-21-A, 7-inch casing to 3950, it would also be.

Q Which of those are now producing oil?

A None of them.

Q None of them?

A No, sir.

Q Now, briefly referring to some of your other tables in your appendix, I wonder if you would look at the Princess Basal Colorado sandstone and there again, with regard to your thickness, I think that is approximately 9 feet, is it not?

A Yes.

Q And what percentage is that of your gross thickness?

A It would be about 60 per cent, if I remember correctly.

Q About 60 per cent there, too?

A Yes, sir.

Q So by using the figure of 60 per cent we could arrive at your --

A Over-all average thickness.

Q Over-all thickness, is that correct?

A Yes.

Q And will you look at the map of your Basal Colorado, and having regard, first, to the map of your Sunburst and then looking at your Basal Colorado, probably you could

D. S. Dunkley,
Exam. by Mr. C.E. Smith.

- 2590 -

explain to me, in any event, why the Basal Colorado does not follow the structural pattern in your Sunburst map?

A Well, I am not a geologist, but the Basal Colorado is a blanket sand that covers a wide area in the Princess region. The Sunburst is a sand which is very close to the Madison Limestone, it has the tendency to pinch out in various places.

Q Well, is there any relation at all to your boundaries in regard to your structural pattern between these two?

A I think this Princess Basal Colorado map is essentially an outline of the isopachs. I think if you looked at a structure map you would find a slight high over the Sunburst area.

Q Well, further than that Basal Colorado, how many wells were tested?

A Very few.

Q Well, were there more than two, Mr. Dunkley?

A Yes. Unfortunately, there were very few of our wells tested. We were not interested in gas at the time we were drilling the wells and therefore neglected the zone, but the part that I have outlined here on the Basal Colorado map is essentially that part that we have fairly large land holdings in. If you will notice, there are wells to the east there.

Q I was just going to say there was another structure. I take it that is not included?

A We do not own very much land there.

Q There are three fair wells off east and a bit north there that would indicate another structure?

A Yes.

D. S. Dunkley,
Exam. by Mr. C.E. Smith.

- 2591 -

Q But the reason that is not included is because of the fact that you are only giving California's?

A Yes. We were only interested in our own land holdings.

Q Coming back to the wells that have been tested, you were going to tell me, I think, how many you have?

A We have two. 76-22-A was tested on the Basal Colorado.

Q I can not read that. Is that the one at the bottom?

A South of Princess C.P.R. No. 1. There is quite a concentration of wells up at the north there.

Q There was one well tested there?

A Yes.

Q What was your drill stem test there?

A 700,000, I believe.

Q 700,000 feet?

A That is right, sir.

Q I do not like this MM stuff.

A The other well was 64-8-19-11, and it tested 3,750,000 feet. It is towards the south there, sir. It is in that concentration of wells in the South Princess.

(Go to page 2592)

D. S. Dunkley,
Exam. by Mr. C. E. Smith

- 2592 -

Q It tested 3,750,000?

A Yes.

Q Now, were there any other tests, Mr. Dunkley, in that area, as outlined?

A Not to my knowledge.

Q There is another well down in what I would call the south-east corner, there has been no test with respect to that, has there?

A That Empire Pete No. 1?

Q I cannot read this at all?

A No, sir.

Q The last well in your boundary, down on the southeast corner?

A No, sir.

Q The only reason I mention that as an illustration, it seems to me that you have gone a long way down there to have no tests in that well, isn't that so?

A Oh, I see. The electrolog and the core description would indicate that there is a fair amount of porosity in the sand.

Q That is where you got your control or your data?

A Yes, that is right. And there is an amount of structural control from wells, and the sand itself is high enough structurally to be gas-bearing.

Q O.K. Now, Patricia, I take it you have used this 2000-acre arrangement we have heard so much about?

A Yes, sir.

Q There is nothing to be added to that, is there, by the way of information?

A No, sir. It could be a lot bigger than it is.

D.S.Dunkley,
Exam.by Mr.C.E.Smith

- 2593 -

Q It could be what?

A It could be a lot bigger than it is.

Q Well, we have heard a lot about that, but that is the reason that you draw your little circle there?

A That is right.

Q Then looking at the Jefferson, or what is called the outline of gas reserve Upper Porous Devonian?

A Yes, sir, looking first at your map, there is no page number there, but you can find it quite handily, I imagine?

A Yes.

Q If I understand the map correctly, the lower lobe is a dotted line, is it?

A Yes, that is right.

Q And then there is this straight line that runs across, I do not know what boundary it is?

A That is the east-west centre line of sections 1 and 2.

Q You see what I mean?

A Yes, I know the one that you mean.

Q Is that supposed to be the southern boundary of the proven?

A That is what we arbitrarily drew.

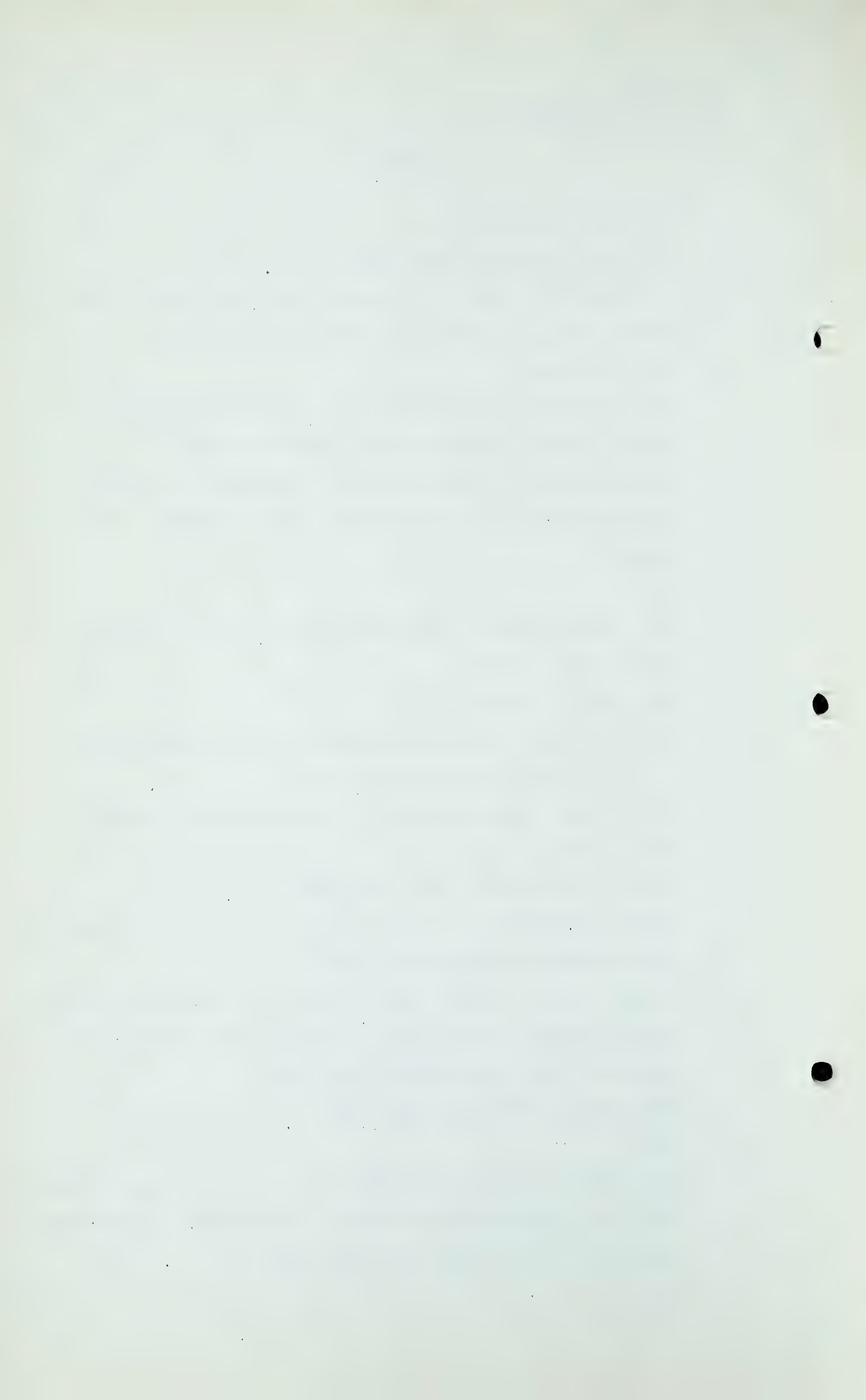
Q I mean, to the layman, that is the first time that I have seen a straight line in any of these things, and I just wondered how you arrived at that line?

A That was an arbitrary guess, sir.

Q Yes?

A Our control down at the south, it is none too good. The only well information we have is 38-31-19-11, to the south-east, just below Range 11 on the line.

Q Yes?



D. S. Dunkley,
Exam.by Mr. C. E. Smith

- 2594 -

A That is the only control we have.

Q What did you get from that well, what information?

A We tested twice. We got nothing or a slight smell of gas in the first test, and the second test was definitely water.

Q I was wondering why you even put that into the probable, Mr.Dunkley?

A This map was arrived a lot from well information and from seismic information.

Q And from that information, why you have made your boundaries for your probable is it is there?

A Yes.

Q There is no other information that you have there?

A The only control is that well 38-31-19-11.

Q Does the same answer apply to the lobe two-thirds of the way up the left boundary there?

A Yes, sir.

Q You see where I mean?

A Yes, that was seismic.

Q That is included, though, in proven, isn't it?

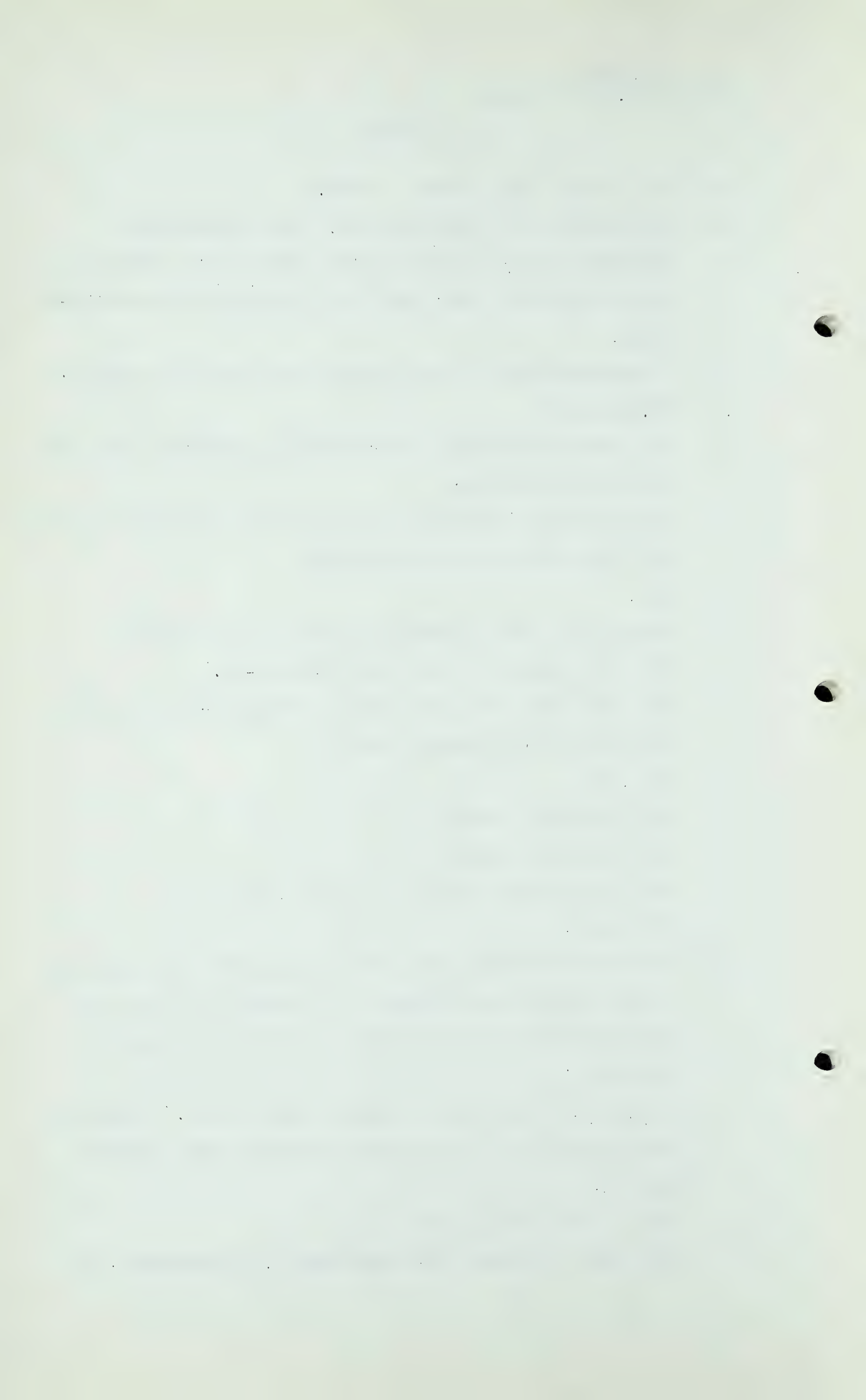
A Yes, sir.

Q Probably you would agree with me that maybe you could use a dotted line there instead of a straight line and cut the lobe off the proven. Would that be a fair way of doing it?

A No, sir. I think that is pretty well proven. There is practically tests of the Upper Porous in every section there.

Q What do you mean by that?

A Each well, Standard McDougall-Segur, for instance, in



D.S.Dunkley,
Exam. by Mr. C.E.Smith

- 2595 -

Section 11, was tested in the Upper Porous and it got gas. Princess-C.P.R. No. 2, in Section 13, was tested in the Upper Porous and it got gas.

Q I see?

A 12-22-A was tested in the Upper Porous and it got gas.

Q Yes?

A It is only three-quarters of a mile from that lobe.

Q From the corner?

A Yes. 6-22-A tested in the Upper Porous and it got gas.

Q Yes?

A Princess-C.P.R. No. 1 tested the Upper Porous and got gas, and the same with C.P.R. No. 6.

Q How did you define your boundary, what data did you have?

A As I said, we have this seismic or structural contour map, which was derived from seismic data as well as well data, and we took, I believe it was minus 1535 as the water line. This boundary that you see is the minus 1535 contour.

Q Well, before I forget it, did you apply the same method with regard to the thickness for the probable as you did to proven?

A Yes.

Q Or why did you take it at 50 to 75?

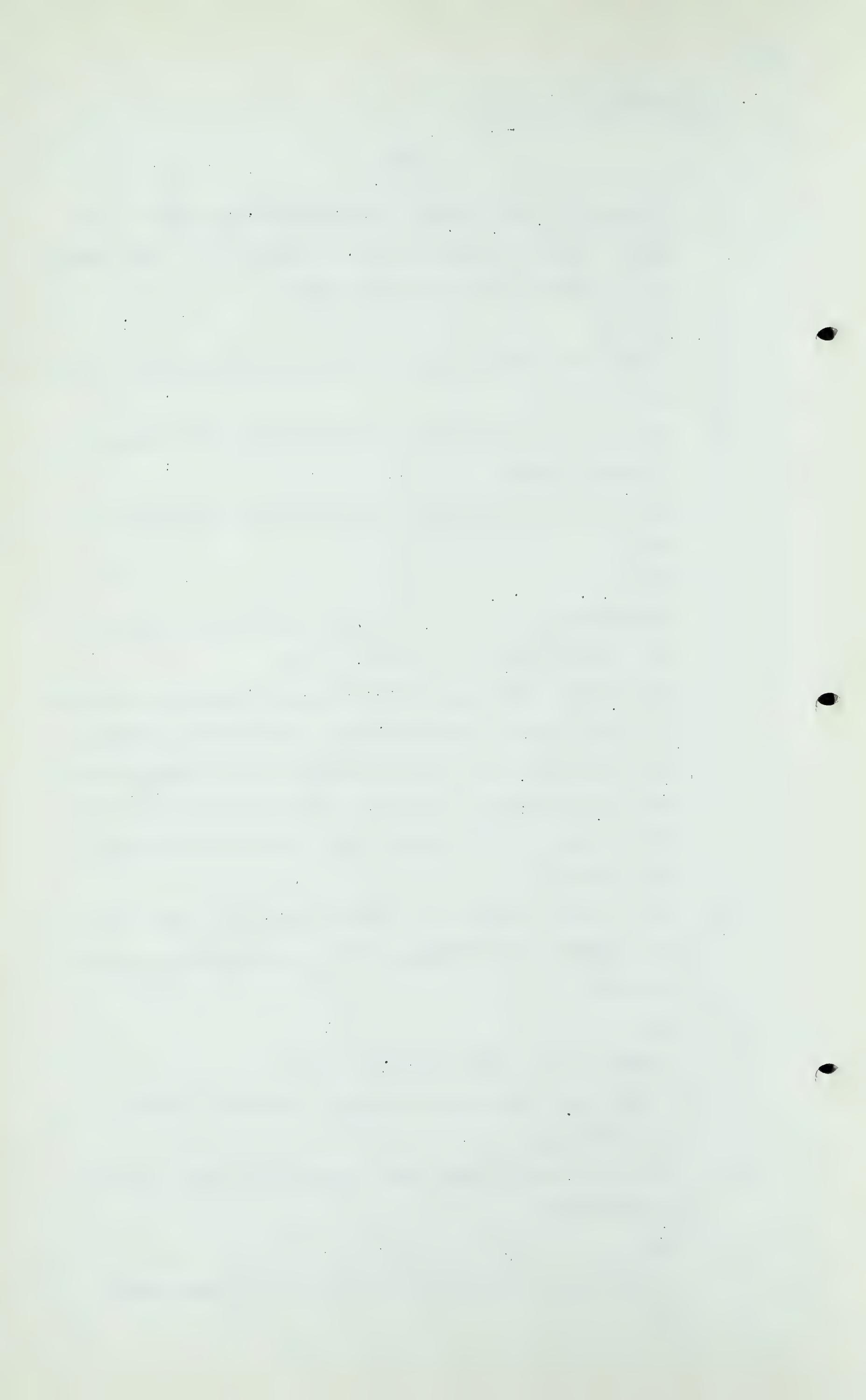
A In some cases there was a greater discount given to the probable.

Q And in some cases there was a greater discount given to the probable?

A Yes.

Q I would think there would be at least in some cases?

A Yes.



D. S. Dunkley,
Exam. by Mr. C. E. Smith

- 2596 -

- Q Do you want to reduce your 50% at all and give us some idea with regard to it in some other cases?
- A The zones that we discounted for probable was the Dunmore-Bow Island.
- Q Dunmore-Bow Island?
- A Yes.
- Q Let us come to the Dunmore-Bow Island. First, referring to your appendix, and having regard to your area of acreage, and I am looking at your map with respect to that, as I understand it, there are two wells from which you have data, is that correct, as shown in the map?
- A There are three wells, sir. There is Larkhall up north there.
- Q Well, you have included that as a 2000, and stuck your probable up around there?
- A Yes.
- Q Having regard to your proven down below there, it strikes me that you have a sort of semicircle around your proven area there, and it runs very far northwest and very far northeast. Is it the same answer to that that you gave to some of the Princess stuff?
- A Yes. We have a fair amount of good geological control in that area. We did a lot of structural hole work.
- Q Structural hole work?
- A Yes.
- Q That, of course, does not show in the map or any place else?
- A No.
- Q As you have told us, you did here again as you did in other cases?

D. S. Dunkley,
Exam. by Mr. C. E. Smith

- 2597 -

A Yes.

Q Structural hole work?

A Yes.

Q Is that what some of us call test hole work?

A Yes.

Q The structural hole work?

A Yes, we call it structural hole work.

Q And you have done quite a large amount of work here, is that right?

A Yes.

Q And that is one of the reasons why your map goes so far up to the northwest and in the other direction, is that right?

A Yes.

Q That may be an explanation that would assist.

A Yes.

Q Does the same situation apply to the Dunmore Basal Ellis?

A Yes.

Q And was there also, in addition to what you have mentioned, the test hole and structural hole work done there?

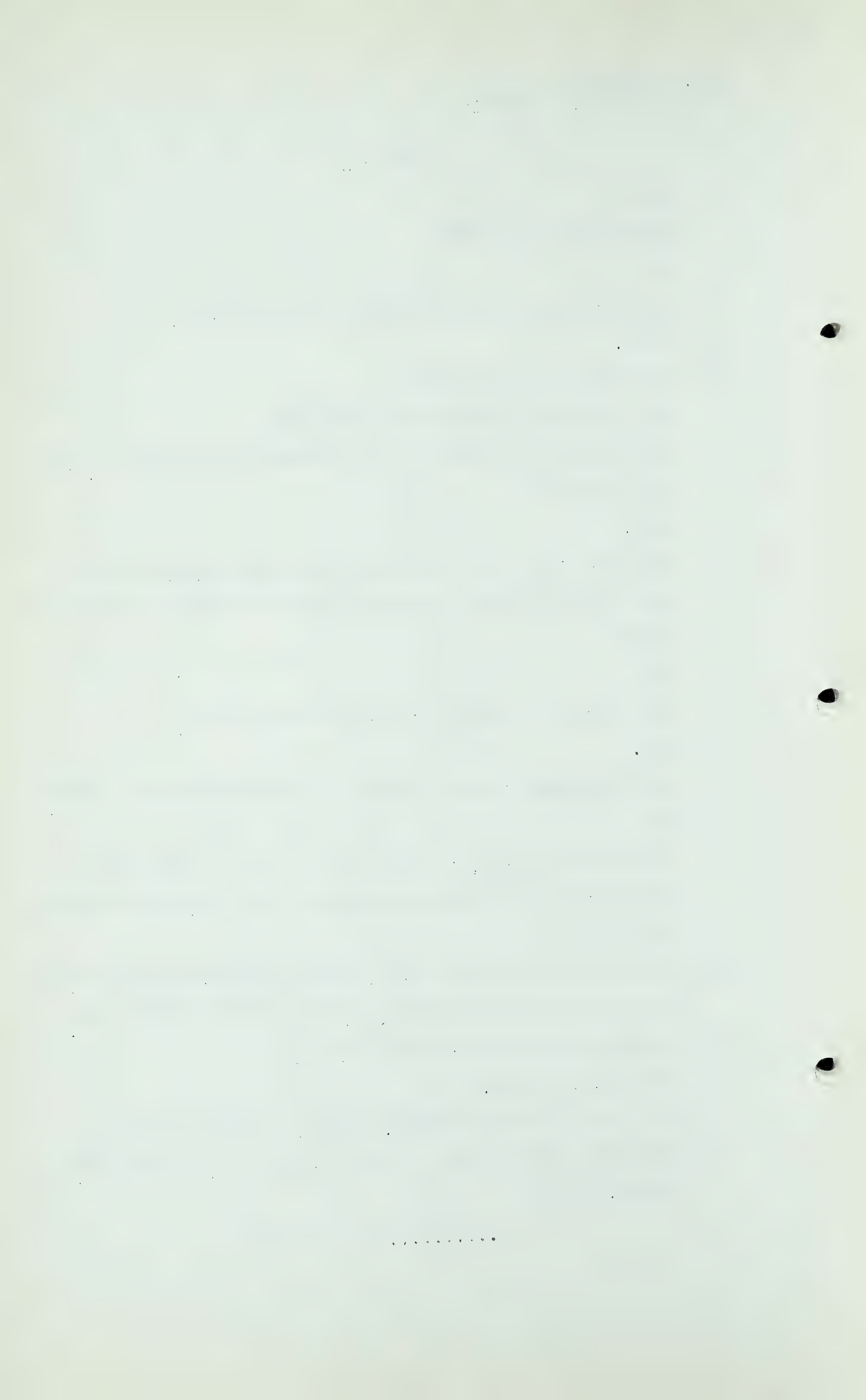
A Yes.

Q Would that account for what I might think might be a little too much area in the proven, having regard to the wells, I mean, or partially account for it?

A Yes, sir, it would.

Q Will you give me one moment, please, seeing as I moved away from there I was. I think that is all, thanks, Mr. Dunkley.

.....



D. S. Dunkley,
Exam. by Dr. Govier

- 2598 -

EXAMINATION BY DR. GOVIER:

- Q Mr. Dunkley, I wonder if you would look at the map showing the outline of the Basal Colorado Sand?
- A Yes, sir.
- Q I am not sure whether I understood you correctly, when you were answering Mr. Smith, but was it to the effect that in the proven areas shown in this map you have only two tested wells?
- A That is right, sir.
- Q Now, I think in connection with the Upper Porous you mention that you had about one test per section, in round figures?
- A Just about. There was enough tests there to practically prove up every section.
- Q But in the case of the Basal Colorado Sand stone that would mean about one test in from 16 to 18 sections, would it not?
- A Yes, sir, that is right.
- Q Do you think, Mr. Dunkley, that there is a sufficient degree of proof of those reserves?
- A Yes, I do, because the Basal Colorado is such a blanket and widespread sand that the probabilities of it being continuous are very high.
- Q I think you said that the outline was largely an outline of an isopach map?
- A That is right.
- Q Has it been substantiated at all by the results of test holes?
- A We ran - I am not exactly sure whether we ran structural holes in that area or not. We ran a lot of seismic work.

D.S.Dunkley,
Exam. by Dr.Govier

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We did a lot of seismic work in the area and obtained a fair amount of control on the Rundle and the Devonian.

Q Is this seismic data of much value to you in interpreting the structure of the Colorado?

A I do not know. You would have to ask a geologist, Dr. Govier. These maps were prepared by myself under the guidance of our company geologist. We have one here if you would care to question him later.

Q Well, perhaps you could tell me to this extent, Mr.Dunkley, in connection with the southern lobe of the proven area you show a line that goes out to the east quite a large way, I take it there are no holes drilled in that area, and no seismic data?

A There would be seismic data.

Q There would be seismic data?

A Yes.

Q Where would the seismic data be from? From wells in that little cluster, you mean?

A No, we seismographed the whole area.

Q I see.

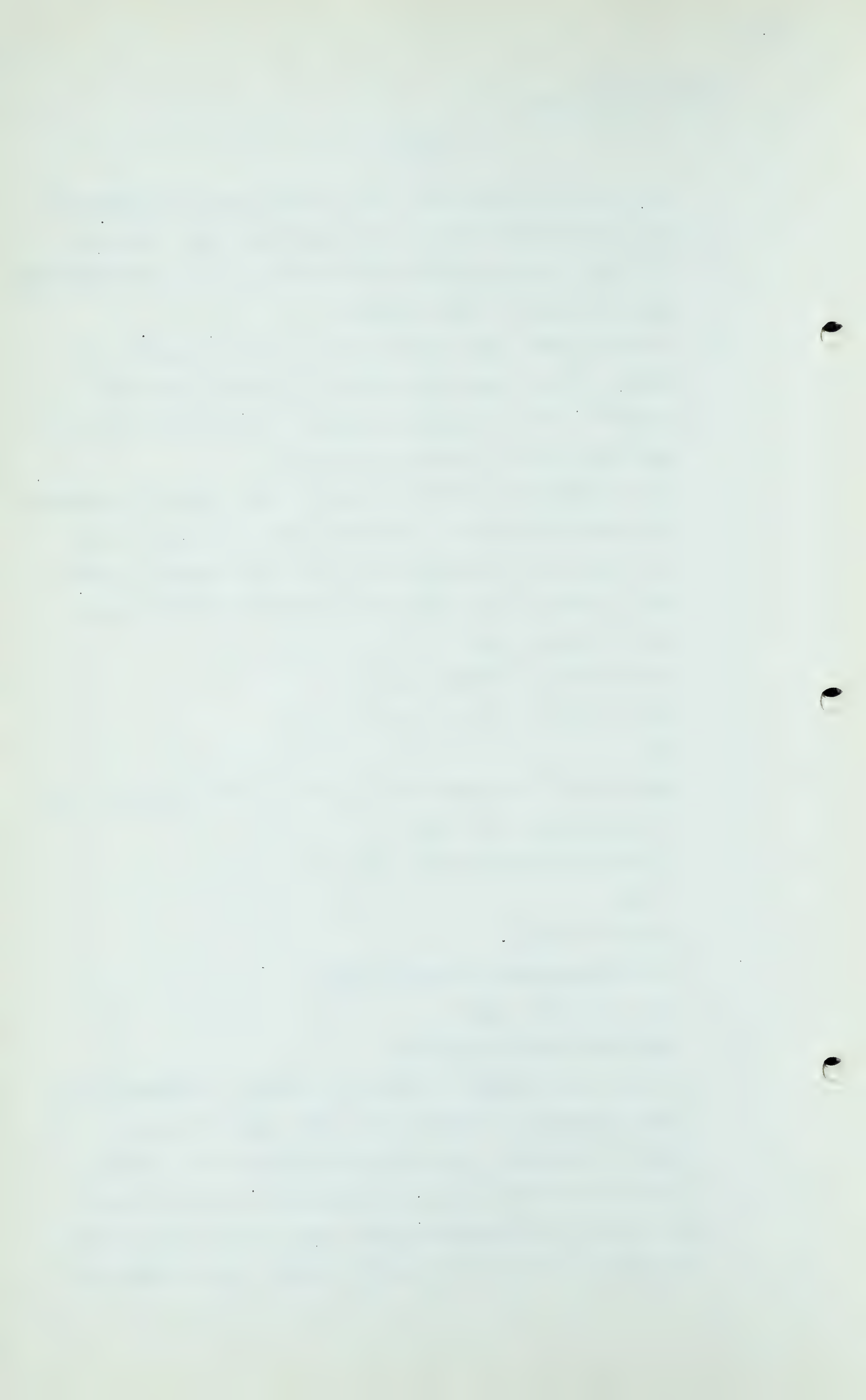
A The entire area.

Q You seismographed the entire area?

A Yes, the entire area.

Q What about electrolog data?

A We have electrologs on most of the wells. Unfortunately, the electrologs on some of the older wells were very hard to interpret. That was due partly to the company that were running them, unfortunately, but we do have a fair amount of information with regard to the sample descriptions on any wells that were cored, and we have the



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core description.

Q One of the things that disturbed me, Mr. Dunkley, was that when you told Mr. Smith as to what was proven, as I recall it, you said, in effect, that what you consider as proven was any gas in the immediate neighbourhood of a well which had been tested and gas nearby going up-structure from such a well, is that about right? I think that is about what you said?

A Yes.

Q I have difficulty in correlating that statement of proven with the area you have taken in the Basal Colorado sandstone. I was wondering if you were taking other factors into account there?

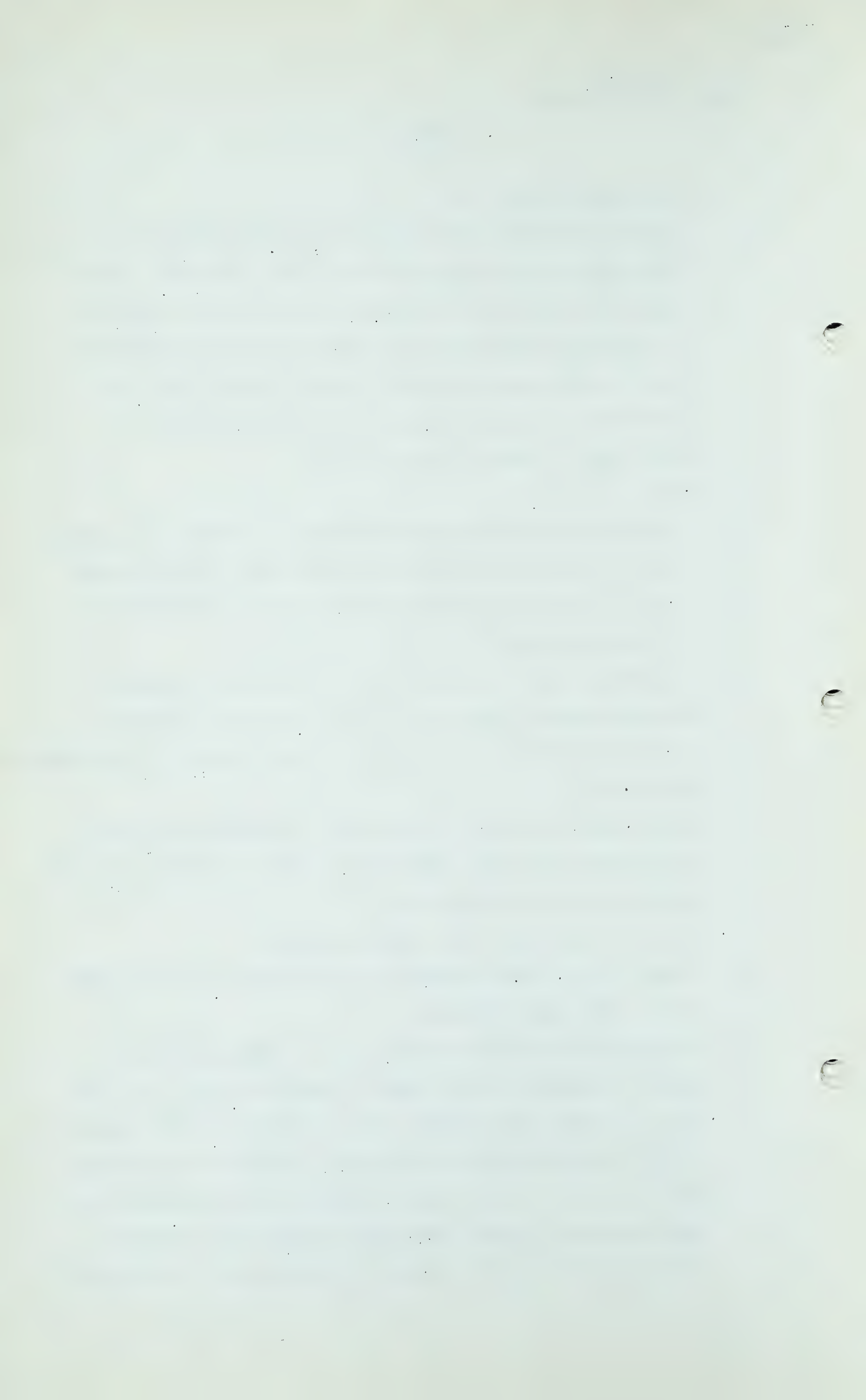
A Actually it was the continuity in the Basal Colorado structure which made me step out so far. If you will notice, the wells to the east there all got gas in substantial quantities.

Q Well, then, we should assume that you perhaps deviated a little way from your definition of proven, because of your knowledge of the conditions?

A No, I do not think that would be right.

Q Would you tell me, Mr. Dunkley, with regard to it, so that I can fully understand it?

A Over this large area here we have, of approximately 9 square townships, we have gas in every township, and the sand, we know, is a blanket and a continuous sand, therefore if we get a well in the north Princess area testing gas and a well in the south Princess area testing gas, at approximately the same structural elevation, and with regard to the area in between, it being at, I am told, the



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same structural elevation, it would contain gas.

Q Well, tell me, Mr. Dunkley, why do you put this little neck of "probable" between the two northern and southern lobes, if you use the theory that this is a blanket sand, and you have gas in these other sections, and you assume the continuous structure? Is that the reflection of the seismic picture?

A Yes, sir.

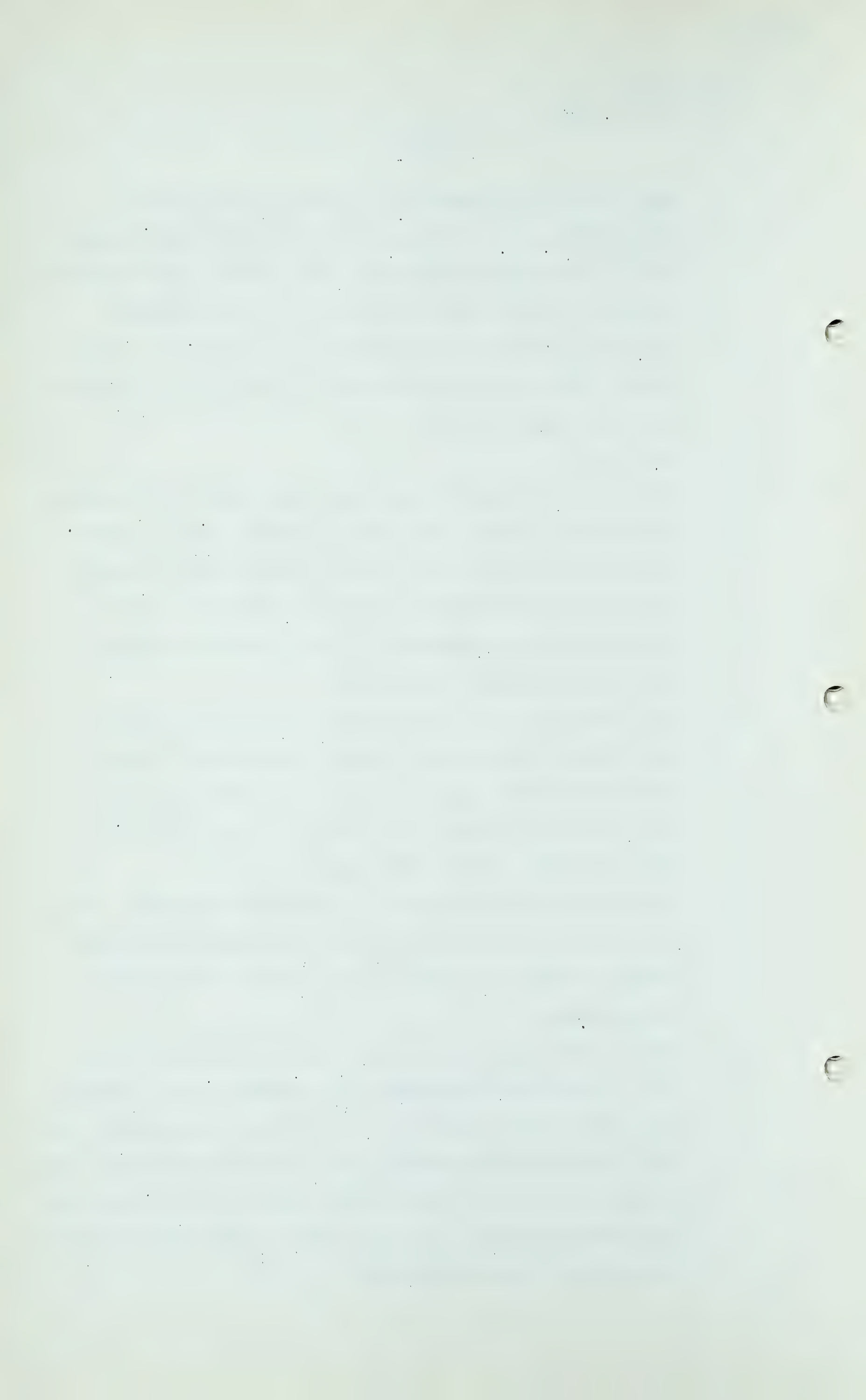
Q That is fine. There is just one other matter, Mr.Dunkley, and that is, would I be right in assuming that because of your definition of the words "proven" and "probable" that you would recognize a distinct difference in the certainty of the ~~exist~~ence of gas in those two groups, or in the reliability of those?

A Yes, there would be. Except that we have more or less to a greater extent put a greater discount on our own probable reserves than we have on the proven reserves, that is, in the actual calculation of the volume. We have been more drastic with regard to that.

Q Is that in connection with the effective thickness factor?

A Yes, that is in connection with the effective thickness factor and also the areal extent, which cut it down considerably.

Q Well, would you help me with this, Mr.Dunkley, if you were in the Board's position and attempting to determine the amount of gas which the Province could reasonably count upon for meeting its present and future requirements, would you add the proven to the probable without any further discount of the probable, or would you be inclined to discount the probable before adding it?



D.S.Dubkley,
D. S. Dunkley,
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A In our case here I would say "no". We are pretty well convinced in our own minds that the results are conservative. We feel that they could extend over a much larger area than has been shown.

Q That means that you would take your estimate of proven and you would add to it your estimate of probable, and you would say "We can count on that total at least"?

A Yes, sir.

Q I just wonder why you would distinguish between them, Mr. Dunkley, if, in the last analysis, you are going to add them together anyway, that is all?

A Well, the only thing or the reason that we have distinguished between the two is the fact that we do not regard our geological control as maybe as good as it is around the proven, and there could be variations.

Q Thank you, Mr.Dunkley.

Q MR. C. E. SMITH: I wonder, might I ask one more question? Mr.Dunkley, I word er if you would give me your test on that, oh, that lower well in the Basal Colorado Princess, I do not know whether I have got one too many zeros in there or something?

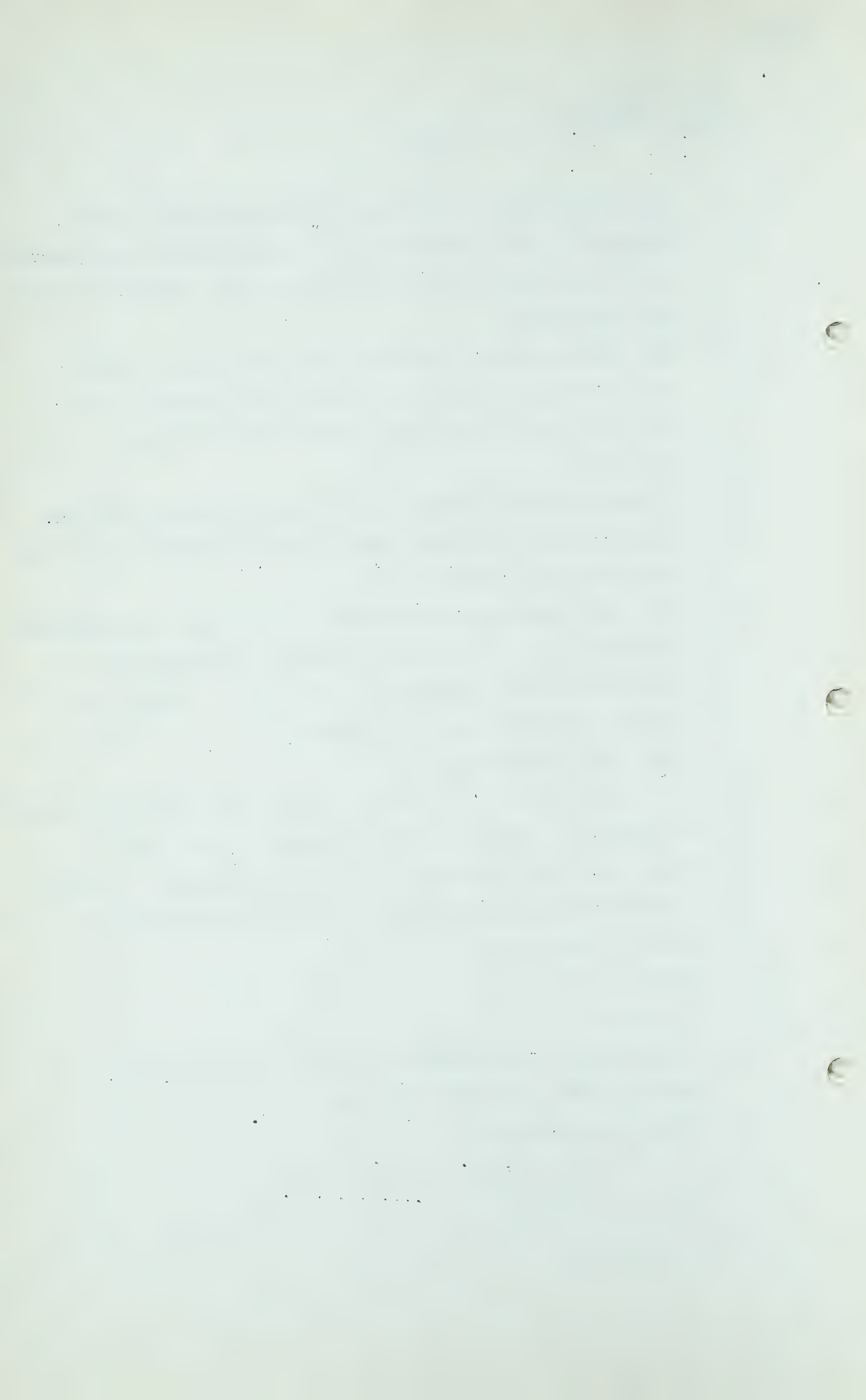
A 64-8?

Q Yes, 64-8?

A I have not got the interval on that test, sir, but it was 3,750,000 cubic feet per day.

Q Thank you, Mr.Dunkley.

.....



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Exam. by Mr. Goodall.
Exam. by The Chairman.

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EXAMINATION BY MR. GOODALL:

- Q Mr. Dunkley, I presume you are aware permission had to be obtained from the Board before you could complete a well?
- A Yes, sir.
- Q Do you think these wells would be adaptable to that decision?
- A I think so. It is just a matter of perforating and inserting a packer.
- Q You do not think you would have any trouble with water killing the well?
- A We could instal some sort of a cross-over nipple in there and divert one zone up over the tubing or through the casing, whatever we wanted to do, and in that way we could blow the water out of the casing, any water that did accumulate.
- Q You think that would be a relatively simple matter to do?
- A I think so.
- Q That is all, thanks.

EXAMINATION BY THE CHAIRMAN:

- Q MR. Dunkley, I wonder if you would mind referring to the appendix on the first page?
- A Yes, sir.
- Q Did you use any discount factor in arriving at this gas in place and make any allowance for gas that might not be recoverable in the reservoir to arrive at your marketable gas figure?
- A Yes, sir.
- Q Would you mind giving us those discount figures?
- A It amounted altogether to approximately 30%. Pardon me, 21%.
- Q Could you give us a breakdown of that?
- A I think we considered about 7% for fuel and about 15% left



D. S. Dunkley,
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behind.

Q 7% for fuel?

A Yes, sir.

Q That would be all the surface loss. Would that be the same for each of those sands?

A Approximately, sir.

Q I wonder if you could give me the percentage for each of those sands, starting off with the Sunburst?

A The Sunburst, the discount factor between gas in place and marketable gas was approximately 21%. I think it was the same for all of them, with minor variations. It may not have worked out at 21% right on the nose but it was fairly close.

Q We could take it as 21%?

A Yes.

Q MR. GOODALL: How about the sulphur content of the Jefferson?

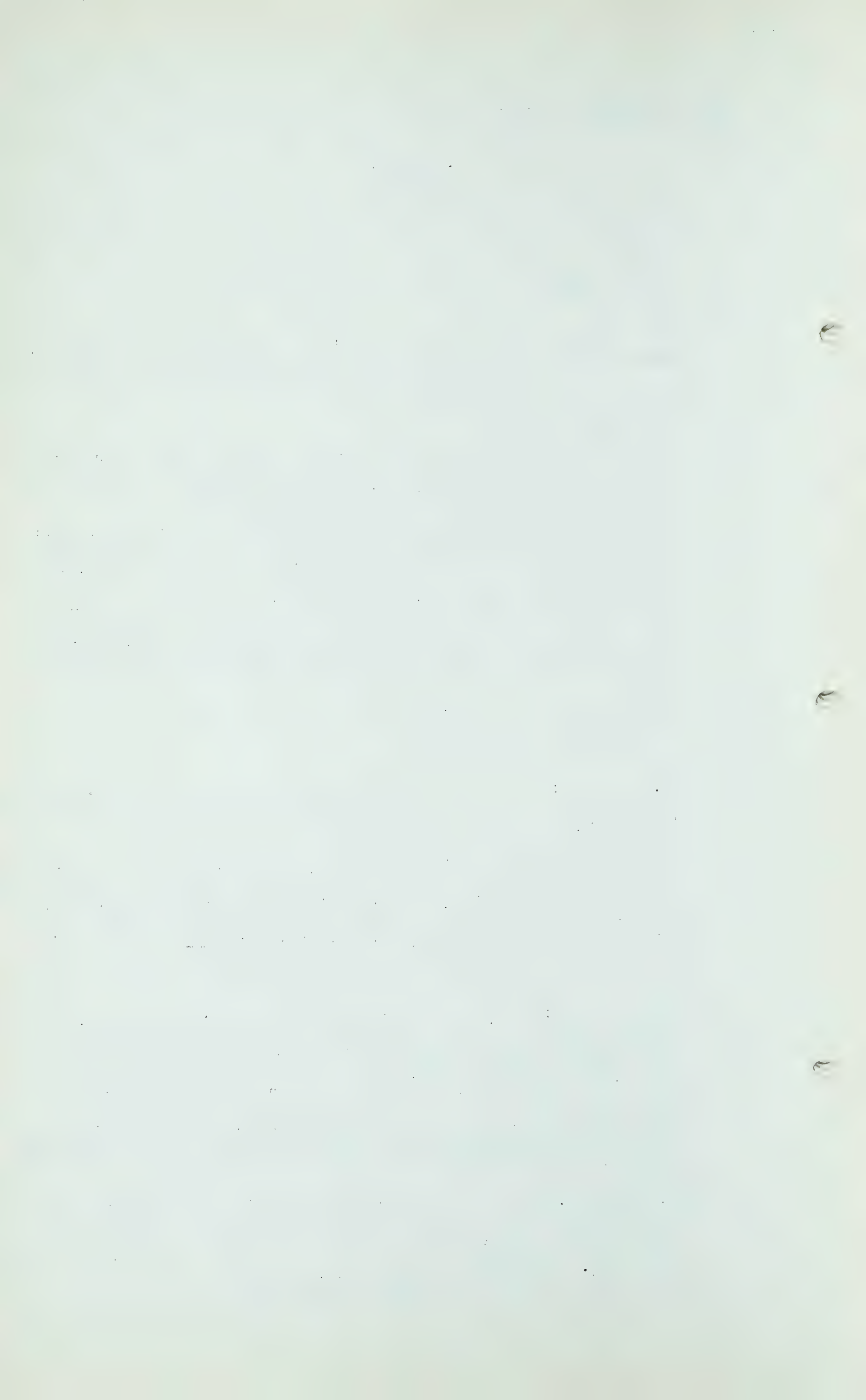
A I beg your pardon. The Jefferson, we discounted an additional 7% for carbon dioxide, so actually the Jefferson would work out to, I would estimate, around about 70% -- I mean, 30% discount factor.

Q THE CHAIRMAN: How would that be broken down?

A There would be 85% of the gas in place, raw gas in place, would be recoverable. Of that raw gas that is recovered 7% would be knocked out for fuel and 6% would be knocked out for CO₂.

Q MR. GOODALL: Were you counting the sulphur in there with the CO₂?

A There isn't very much sulphur in that gas.



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Exam. by The Chairman.
Exam. by Dr. Govier.

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Q It would require scrubbing, though, wouldn't it?

A It would require scrubbing for the CO₂, yes. As far as I can recall, our sulphur content in the gas there are quite low. The Devonian gas is high CO₂ and fairly high nitrogen.

Q How about the nitrogen, is that included in the CO₂?

A Well, fortunately there is enough BTU behind it the nitrogen can go right into the line. It reduces the BTU value all right, but it does not reduce it to the limit specified by the contract.

Q It would be over 950 BTU?

A Yes.

EXAMINATION BY DR. GOVIER:

Q Mr. Dunkley, does the discount figure which you have just been speaking of include any allowance for a reservoir loss over and above that corresponding with the reservoir abandonment pressure?

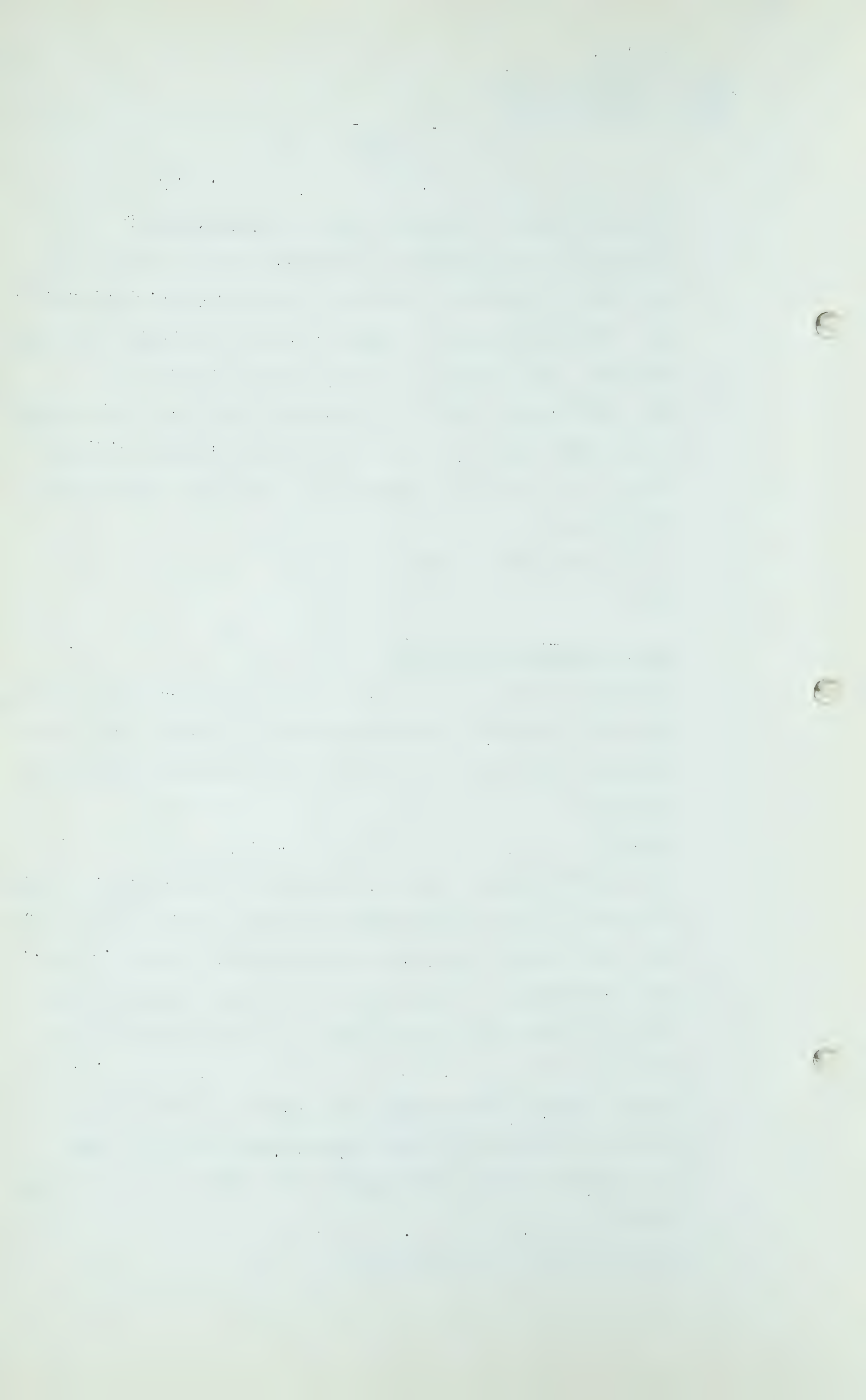
A No, sir.

Q Do you think in the case of thin sands, where there is a danger, at least, of water encroachment cutting off part of the reserve, that there is any need for such a further discount factor?

A Well, personally, I think that we have been drastic enough in our effective thickness factor to account for a lot of that.

Q I see. So that this figure, for example, of 21% for the Sunburst includes first the equivalent of the 250 pound abandonment pressure and secondly, the 7% fuel loss, is that right?

A Would you repeat that, please?



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Q The figure of 20% which you have used for the Sunburst sandstone includes first the equivalent of the 250 pound abandonment pressure and secondly, the 7% fuel loss?

A Yes, sir.

CROSS-EXAMINATION BY MR. MILVAIN:

Q I wonder, might I ask just one questions. I am looking, Mr. Dunkley, at the map which is on the third sheet headed "Princess Area"?

A Oh, yes. "Outline of Gas Reserves."

Q Yes. I notice in section 11 of township 19, range 11 . . .

A Yes, sir.

Q . . . there is a well shown there with a round circle, white in the middle and four little points sticking out?

A Suspended gas well.

Q Does that mean to say you struck gas there?

A Yes, sir.

Q It is a well that is a potential producer?

A That is right, sir.

Q Then I notice that in section 8 of the same township and range there is a well in there that has got a number of stars around it, more than one point?

A Oh, I am sorry, I must have had you confused there. I thought that was the well that you were referring to at first. The other well is an abandoned well.

Q The one in section 11, that is the one out to the east, what you might say in the southeast lobe of that map?

A It is Empire Pete No. 1. Is that the one you mean?

Q I cannot read what is written there. Yes, it is Empire Pete No.1.

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A Yes, that is an abandoned well.

Q That is an abandoned well?

A Yes.

Q I am wondering why you would base calculations on an abandoned well which would show a proven area?

A That area is the probable area.

Q Oh, that is the probable area?

A Yes.

Q Is that a broken line around there?

A It is supposed to be. It is too close.

Q Oh, I see. Where you have a well marked with a number of little points around it, as there is in section 8, that shows a producer?

A That is a suspended well.

Q What are the black?

A Those are abandoned oil wells.

Q I see.

THE CHAIRMAN: That will be all, thanks.

MR. S. B. SMITH: I will call next Mr. R. D. Ricketts.

.....

R. D. RICKETTS, having been first
duly sworn, examined by Mr. S. B. Smith, testified as follows:

Q Mr. Ricketts, you live in Houston, Texas, I believe?

A That is correct.

Q And you are a graduate of Ohio State University?

A Correct, sir.

Q What year?

A 1931.

Q And in what department of the University?

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A College of Mechanical Engineering.

Q You hold, I believe, a Professional Engineer's licence in Ohio and in Texas?

A That is correct.

Q Following your graduation, with whom did you become associated?

A In 1931, following graduation from college, I was employed by the Columbia Gas & Electric Corporation and was assigned as a Junior Engineer to the various operating and construction programs which they had under way at that time, and followed through the regular routine training course that was normally in operation with most gas companies at that time. Later on I became Construction Superintendent, carrying on the various compressor stations, gasoline plant construction operations for their various subsidiaries, and in 1936 I was assigned to the Panhandle Eastern Pipeline Company in Kansas City, Missouri, as a Division Superintendent. On this work I not only was engaged in operation but was also engaged in detailed design work of the entire system, the actual construction phases of the operations pertaining to compressor development, and in late 1937, early 1938 I was made Assistant Superintendent of Compressor Stations.

Q You remained with Columbia Gas & Electric Company until when?

A Until 1939 when I resigned and joined the Stearns-Rogers Manufacturing Company in Denver, Colorado.

Q What are they and what do they do?

A Stearns-Rogers is a Consulting and Contracting Engineering firm, having four principal operations. Of the four, one is the oil and gas development, of which I was a member. Their main work was the building of gasoline and liquid hydrocarbon

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extraction plants, design of gas transmission lines, compressor stations and other allied operations with the oil and gas industry.

Q Did you have something to do with Tennessee Gas Transmission Company when you were in the employ of the Stearns-Rogers Manufacturing Company?

A Yes. Mr. Fish, President of our company, at that time was with Stearns-Rogers Manufacturing Company and he was appointed Vice-President in charge of all construction operations with the Tennessee Gas & Transmission Company, and I handled all the detailed design work for Mr. Fish and consulted with him during its construction on various phases. However, I was not assigned directly to the project. My work at that time was the complete responsibility in charge of the Katy Gasoline Plant, which still remains the largest natural gasoline re-cycling plant in the United States.

Q And, Mr. Ricketts, I believe in 1946 the Fish Engineering Corporation was formed and you and Mr. Fish from that time on have been associated with that company?

A That is correct, yes, sir.

Q In 1946, I understand, you had something to do with the Trans-Continental system. I would like you to tell us what you had to do with that?

A The Trans-Continental Gas Pipe Line Corporation was officially formed by the association of the so-called Fish group, and the Rogers-Lacey group, represented by Mr. Claude A. Williams, now President of the Trans-Continental Gas Pipe Line Corporation, in 1946. I worked continuously from 1946 through early 1951 on the Trans-Continental project in the capacity of being in

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complete charge of all the design, carried it through the Federal Power Commission hearings, representing the engineering phases of the project, and when it became a reality with the issuance of a Certificate of Convenience and Necessity by the Federal Power Commission, I was placed in complete charge of the entire construction program for the whole facilities.

Q And then in 1948, I understand that you had to do with the Texas-Illinois line?

A That is correct. I consulted with the other members of the staff, Fish Engineering staff, and under my supervision the Texas-Illinois design was developed and it has been according to that design that the physical facilities have been built.

Q And have you been involved in any other natural gas processing plants in allied industries that you have not told us about?

A Oh, yes, during the period of the development of the Trans-Continental and other pipe lines, we carried on our normal business of design and construction of gas processing plants, chemical plants, refineries and dehydration plants, most of the processing plants allied with the oil and gas industry. We have carried on an intensive program and have built, I would say, five or six of the larger plants during that time.

Q And you are now, I understand, Vice-President of the Fish Engineering Corporation?

A That is correct.

Q And that is an organization of some size?

A That is correct.

Q Now, you have here a submission entitled "Marketing, Engineering & Economic Study of the Proposed Gas Facilities." That was

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prepared, I understand, under your supervision?

A That is correct.

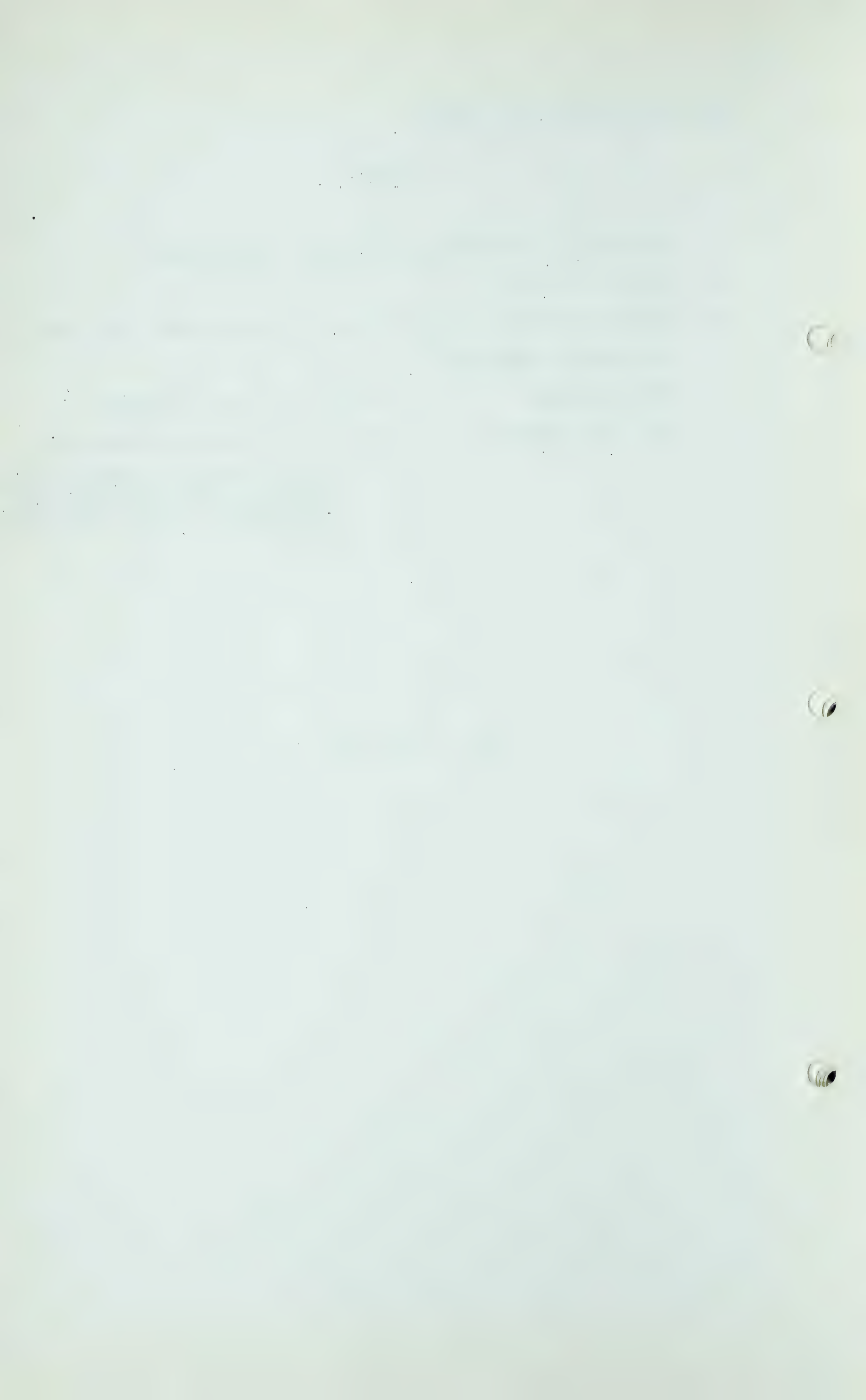
Q I would like to tender that, and I believe that, sir, will
be exhibit number 98?

THE CHAIRMAN: Is that for Eastern Canada?

MR. S. B. SMITH: No, this is the Western one, sir.

BRIEF ENTITLED "MARKETING, ENGINEERING AND ECONOMIC STUDY OF
PROPOSED GAS FACILITIES" MARKED
EXHIBIT 98.

(Go to page 2612.)



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Q Mr. Ricketts, what are the facilities dealt with in Exhibit 98, and what do they consist of?

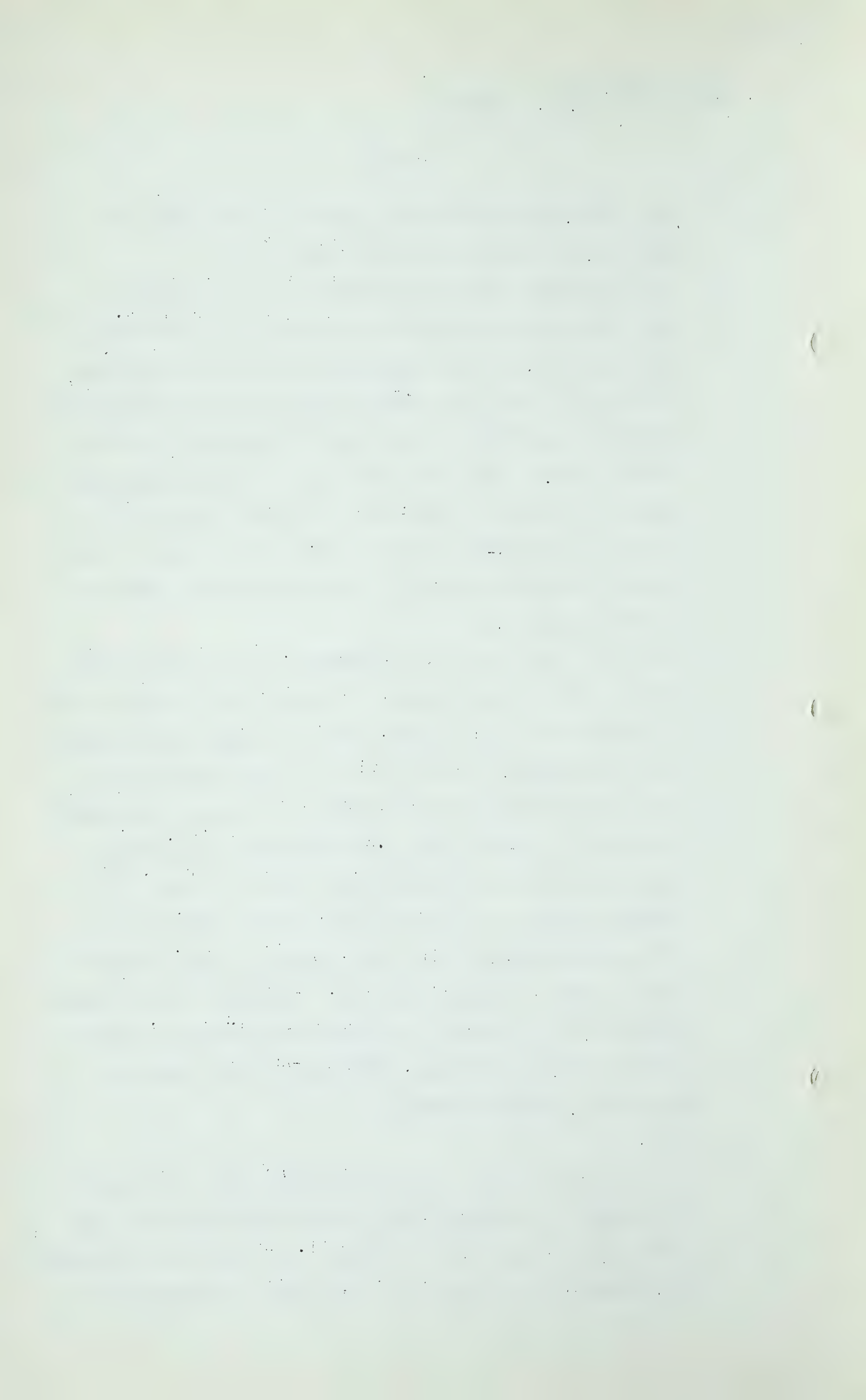
A The facilities presented in Exhibit 98 consist of a gas transmission system originating at Pincher Creek, Alberta, Canada, and extending westerly across Canada, leaving the Province slightly below Trail, and then going south and westerly to the State of Washington, in the United States, connecting the various markets with the source of gas at Pincher Creek. We have designed the system in two phases or two parts, one of which we have termed the Canadian property and one we have termed the American property.

Q Excuse me just a minute, Mr. Ricketts. You have open in front of you the second map, I believe, or the first one?

A I have the first map opened, but both maps show the same pipe line system. Dealing with the pipe line system first originating at Pincher Creek, we propose to install 260 miles of 24-inch pipe, .281 wall pipe line, which would leave British Columbia just south of Trail. In Canada, going to the lefthand side of the map, we have 23 miles of 10 $\frac{3}{4}$ -inch pipe line, 1/4-inch wall, I would like to make a correction there. I believe the map shows 12 $\frac{3}{4}$ -inch. It is actually designed as a 10 $\frac{3}{4}$ -inch, going from the Canadian Border, Canadian-American Border to Vancouver, British Columbia.

Q Yes?

A In addition we have 7 miles of 2 $\frac{1}{2}$ -inch pipe line going from Trail to Rossland, and 13 miles of 6-inch pipe line going from the main line to Trail. And there is a lateral at Kimberley to the main line, and that is 19 miles of



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3-inch line. That constitutes the initial proposed pipe line system in Canada.

I believe that the American system, in the State of Washington, is detailed on the map, and is self-explanatory, the main line, of course, being that from the point of intersection of the north-south lateral lines at the lefthand side of the page back to Trail. There are two lateral lines which are self-evident, with the length and sizes shown. For convenience we have included a second map which shows the initial compressor stations to be installed. There will be one station in the Canadian system consisting of four 1320 horsepower units installed at the Kimberley lateral take-off. That is the only necessary station for the initial operation.

There are two stations in the American section of the system, one to be installed just south of the system's entry into the United States, at which we propose to instal for 1320 horsepower units, and there is a second station at Wenatchee, in which we propose to instal four 1100 horsepower units. The requirements, pressure ratio, and suction and discharge pressures are shown in the square above each of the stations, and I believe you will find those self-explanatory,

We have taken into account in all cases altitude, de-rating for altitude of the power unit.

With those two maps, I believe our physical system is well defined for the first year's operation of initial installation.

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Q Mr. Ricketts, you told us that you were Vice-President of Fish Engineering Corporation?

A Yes, sir.

Q What is the relationship of the Fish Engineering Corporation to Pacific Northwest, and what is the engagement or has been the engagement of Fish Engineering Corporation in relation to this project?

A Fish Engineering Corporation have been assigned or given the assignment of preparing and advising Pacific Northwest on all engineering matters pertaining to the pipe line system which they propose to build. We have consistently and entirely given them all the engineering service which they have required, including the exhibits to be presented here today.

Q And upon what information, what basis of information was your design laid out so far as the initial supply of gas is concerned?

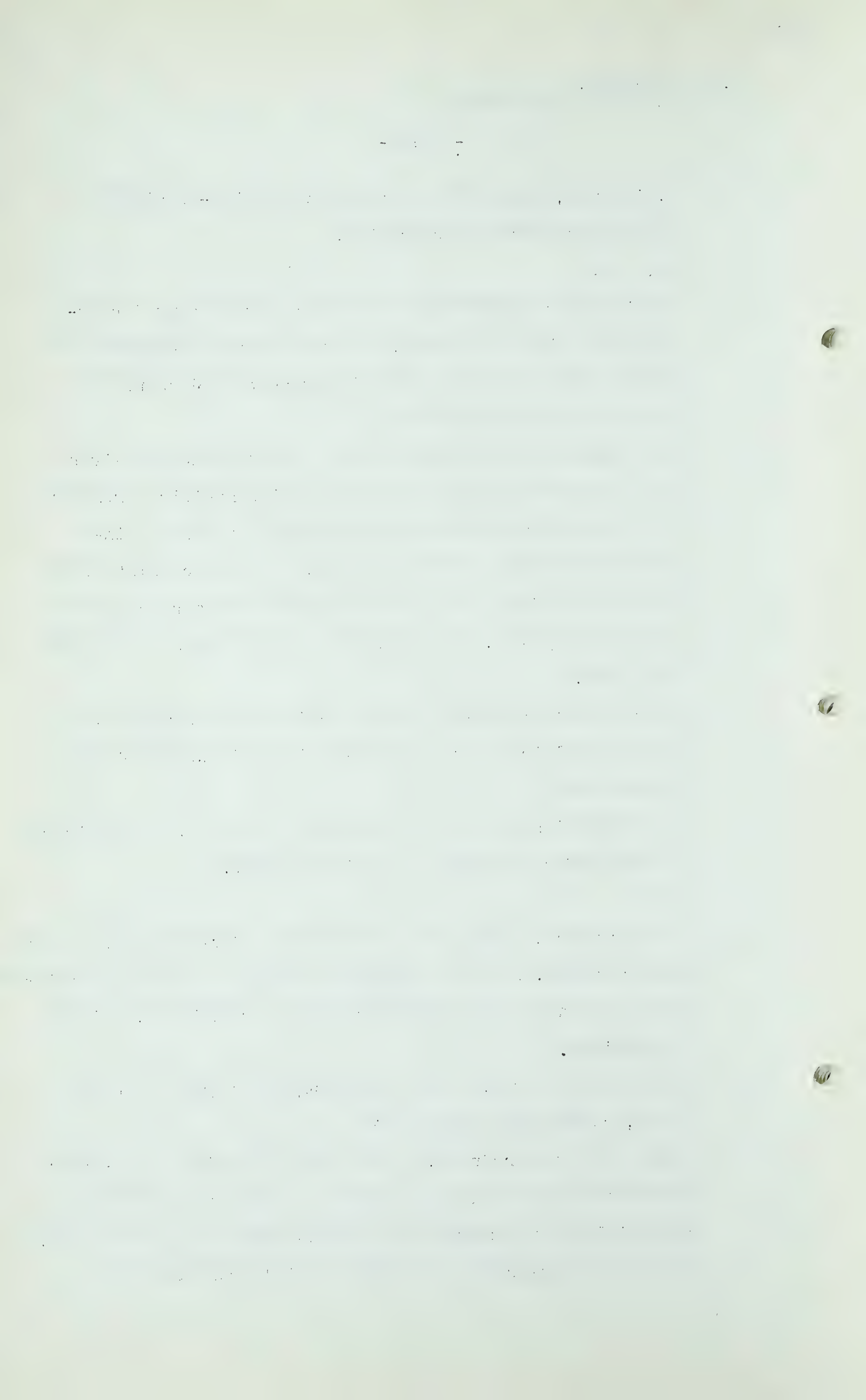
A Our information was taken from that given us by the officers of the Pacific Northwest Pipe Line Company.

Q Yes?

A In other words, they have given us the information for supply and for market. We have designed a line to meet the conditions which they have given us with regard to capacities, origin and terminus.

Q And the initial gas, the initial supply of gas for that system, comes from what field?

A Comes from Pincher Creek. We have been advised by Pacific Northwest that they have a supply of gas at the Pincher Creek field in the amount of 200 million cubic feet per day, and we have designed a system which will transport 200



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million cubic feet per day to the market as shown in the outline of the map. That 200 million, of course, is the sales quantity of the gas, and, in addition to that, there is fuel to consider.

Q Mr. Ricketts, would you now briefly summarize and explain the engineering costs' estimate contained in this Exhibit 98?

A Beginning with page 1 in Exhibit 98, we have summarized the estimated construction costs for a system to transport 200 million cubic feet of gas per day from a point below Trail to the United States points in the State of Washington, and to a point entering Canada again just south of Vancouver. In other words, the summary on page 1, and the subsequent back-up pages to through page 4, pertain to the American system.

The summary given on page 5 represents the estimated investment costs for the Canadian system, and the detail is given on subsequent pages 6 through 8.

Reviewing the summaries briefly, we estimate that the survey and mapping will require approximately \$326,000.00, and a unit cost of \$500.00 per mile. Right-of-way and damages \$835,000.00. Main line pipe \$16,000,000.00. I am giving these in round figures. Coating material \$712,000.00. Installation \$19,000,000.00, and so on, with a total cost of \$46,000,000.00 for all the physical facilities required.

General Plant facilities, such as communication equipment, furniture and fixtures, transportation equipment, operating tools and equipment, and so

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forth, we estimate will cost a total of \$550,000.00, divided as shown.

We have estimated a contingency in the amount of 5%, which is normal, and we think conservative, giving an amount of \$2,366,000.00.

For engineering and supervision, we estimate 5%, \$2,484,000.00.

Interest during construction, 5%, \$2,484,000.00.

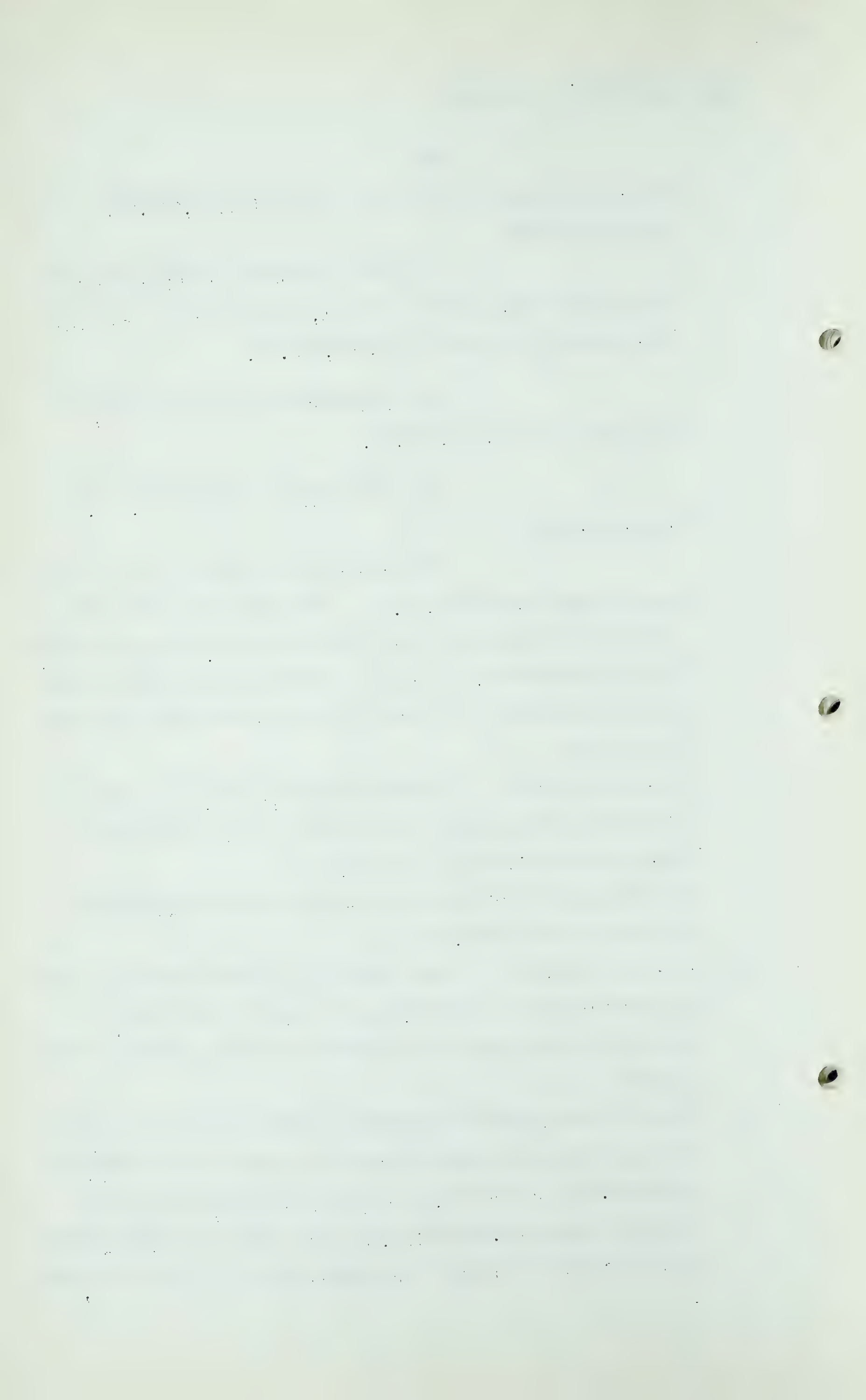
The total plant costs in the United States being \$54,656,900.00. The details of that and the items showing unit costs are set out and, in my opinion, are self-explanatory, and are adequate and reasonable for the installation of the facilities described and presented in the maps.

Q MR. C. E. SMITH: Before you leave page 2, is there a correction with respect to your 10 $\frac{3}{4}$ and 12 $\frac{3}{4}$ -inch pipe given, was that mileage all right?

A The mileage is all right with regard to the designation as given in the details.

Q MR. S. B. SMITH: Mr. Ricketts, I observe when you come to your detailed costs study, you commence with Item 3. Why is it that Items 1 and 2 are not in the detailed costs study?

A Items 1 and 2 are not included in the detailed costs study because there is no way of obtaining definite and specific information. For example, survey and mapping, we have included that at \$500.00 a mile, and that is an experience figure, which is based on a large amount of pipe line work,



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including the Trans-Continental system that consists of approximately 2400 miles of pipe line built in the last two years, beginning in 1949 and ending in 1951, and we feel that the figure is reasonable and adequate. It is based on actual experience costs for doing similar types of work, and doing it in the same manner which we propose to do it on this project.

Q By the way, was Trans-Continental built in a rising market, so far as labour and materials were concerned?

A Yes, Trans-Continental was built during a very difficult economic period. It is a well-known fact that labour costs were rising all during the construction period of 19 - during the construction periods of 1949, '50 and '51. Materials were also rising. Firm figures were difficult to obtain, with most of it being quoted at a price existing at the time of shipment. However, some of the major items we were able to obtain fixed figures on.

Q And did your actual costs there over-run your estimate?

A Yes, they did.

Q By what amount, what percentage?

A The latest figures on the Trans-Continental system are \$10,000,000.00 over-run in a total estimated cost of approximately \$240,000,000.00. Now, that \$240,000,000.00 is within a few hundred thousand dollars of being the exact figure. It is pretty close.

Q Well, roughly. . . .

A It represents approximately 4-2/10% over-run, which I think is a very good record for a project of that magnitude.

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Q What allowance for contingencies had you provided there?

A We had provided in that one slightly under 5%. There was \$8,000,000.00 provided in contingencies, ..but that was included in the \$240,000,000.00.

Q And what have you to say as to whether, in your opinion, the figures which you show in Exhibit 98 will be close to what is required to construct this system, based on your experience, which you have been describing to us?

A Well, considering the economic situation in the United States, and in general, as we know it today, we are continuing in a rising market both for labour and materials. It is my opinion that the figures presented here are reasonably close to what can be anticipated for the overall cost of construction, providing the system is installed as designed and presented in this exhibit.

Q How many major pipe line construction projects are there that you have been connected with, Mr. Ricketts?

A I have been connected with three major pipe line construction operations.

Q Do I relate them correctly when I say Panhandle Eastern, Tennessee, and Trans-Continental?

A That is correct. Panhandle Eastern, pertaining to their initial expansion program in 1936, Tennessee Gas in 1943, and Trans-Continental, and we might add the experience of a Texas-Illinois line which is just now going into operation. I understand it was placed into operation yesterday.

Q And you, personally, as I understand it, were in charge of all the Trans-Continental facilities with regard to edesign and construction, is that correct?

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A That is correct.

Q Now, I would like to ask you about your engineering and supervision provision of 5%?

A Yes, sir.

Q What have you to say as to the reasonableness and adequacy of that figure, and also your provision for interest during construction, which is also 5%?

A The engineering and supervision figure of \$2,484,000.00 is to provide for such items as the engineering cost of preparing alignment sheets, survey and mapping, certification of all survey and mapping, and co-ordinating it into the final maps which can be used for the construction of the line, the purchase of materials, the preparation of contract specifications, the obtaining of bids, and all of those various things, and the handling of the voluminous accounting operations on such a project, and the general over-all overhead with regard to supervision and inspection of the installation of the facilities.

Q Yes?

A The interest during construction is presented at 5%, which we feel is a fair figure to take care of the interest on borrowed capital and to provide something for the equity capital during the time the project is being constructed. It is an experience figure, and we feel that it will prove to be very close.

Q Where are your comments about your provision of \$1,000,000.00 for working capital?

A We feel that \$1,000,000.00 for working capital is a reasonable fund to take care of the working capital for this operation and during construction. It is based on the experience

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with regard to the Trans-Continental system, and other systems which we have been affiliated with.

Q Well, now, Mr. Ricketts, would you proceed to deal with your detailed engineering costs study, and I take it you will turn now to page 2. Is that where you wish to commence?

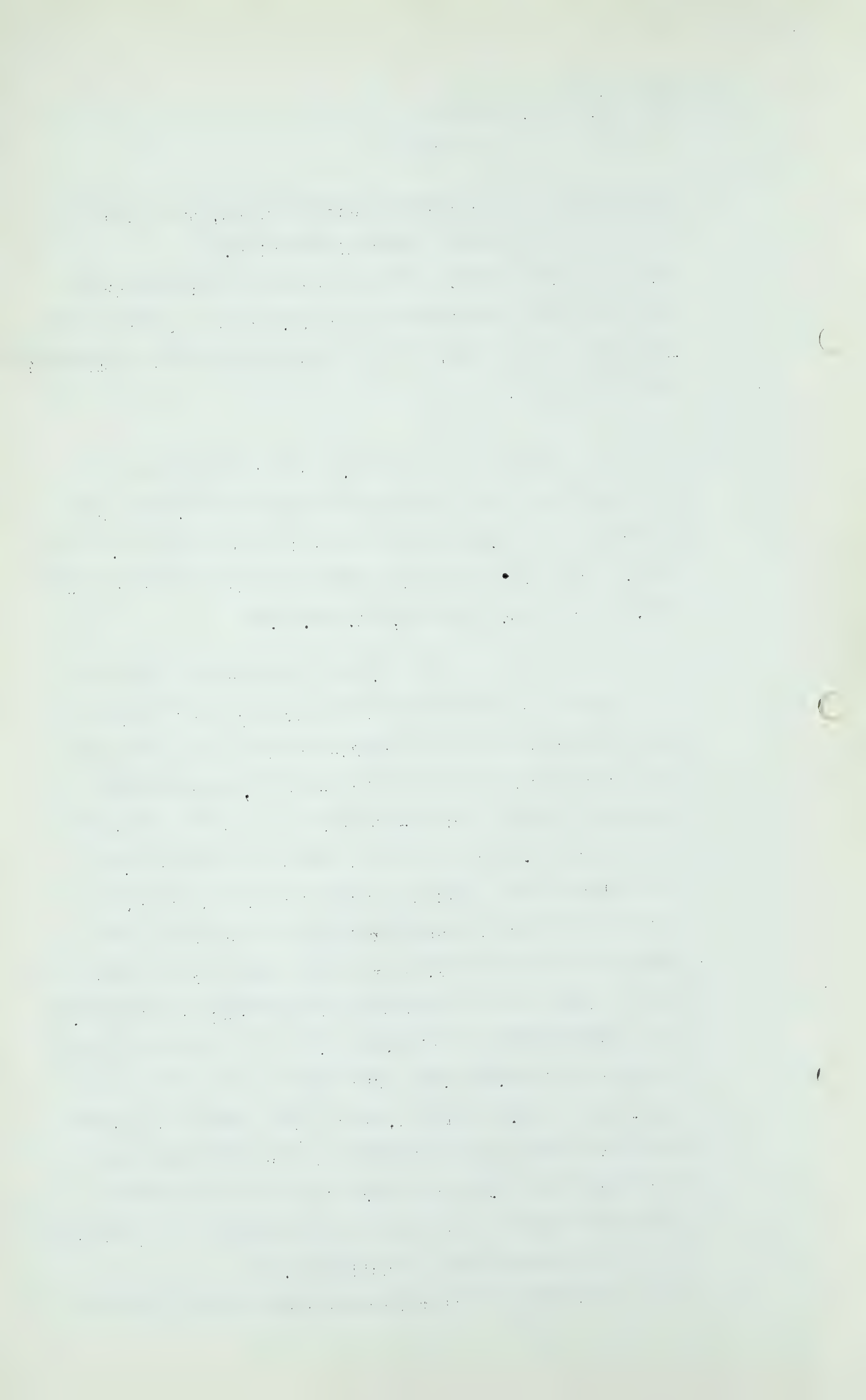
A That will be fine.

Q Yes?

A On page 2, beginning with Item 3, Main Line Pipe, we have summarized the total tons of pipe required. We show a unit cost of \$140.00 per ton, a freight cost of \$25.00 per ton, and \$12.00 per ton, and with the resulting mathematics, we arrive at the \$16,094,000.00.

The \$25.00 per ton on freight is an estimated figure representing the average freight rate which will be required to place 24-inch pipe from a West Coast fabricating shop to the right-of-way, to freight destinations along the right-of-way. You will note that there is only \$12.00 required on some of the laterals, but those laterals are all along the Coast, and we have established a very favourable freight rate due to the competition of water rates, so that these are freight rates which we feel can be obtained under present-day conditions, for transportation of the pipe. Now, if there are future increases in freight, why, the figures would have to be adjusted. The \$140.00 per ton, as the result of current quotations which we are getting on pipe from the major manufacturers of pipe, we feel that it is a reasonable figure and should be included at that amount as a realistic picture of the costs of these facilities.

Q Could I interrupt you at that point and ask you how many



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fabricators there are in the United States of large diameter pipe, that is, 20-inch and larger?

A Well, I do not know how many fabricators there are, but we generally consider five as being representative.

Q Yes?

A We have discussed this problem with such people as Consolidated Western Steel Corporation, Kaiser Steel Corporation, A. O. Smith, National Tube, both with regard to seamless and welded pipe, Bethlehem Steel and Republic.

Q Have you done business with all those companies in the past?

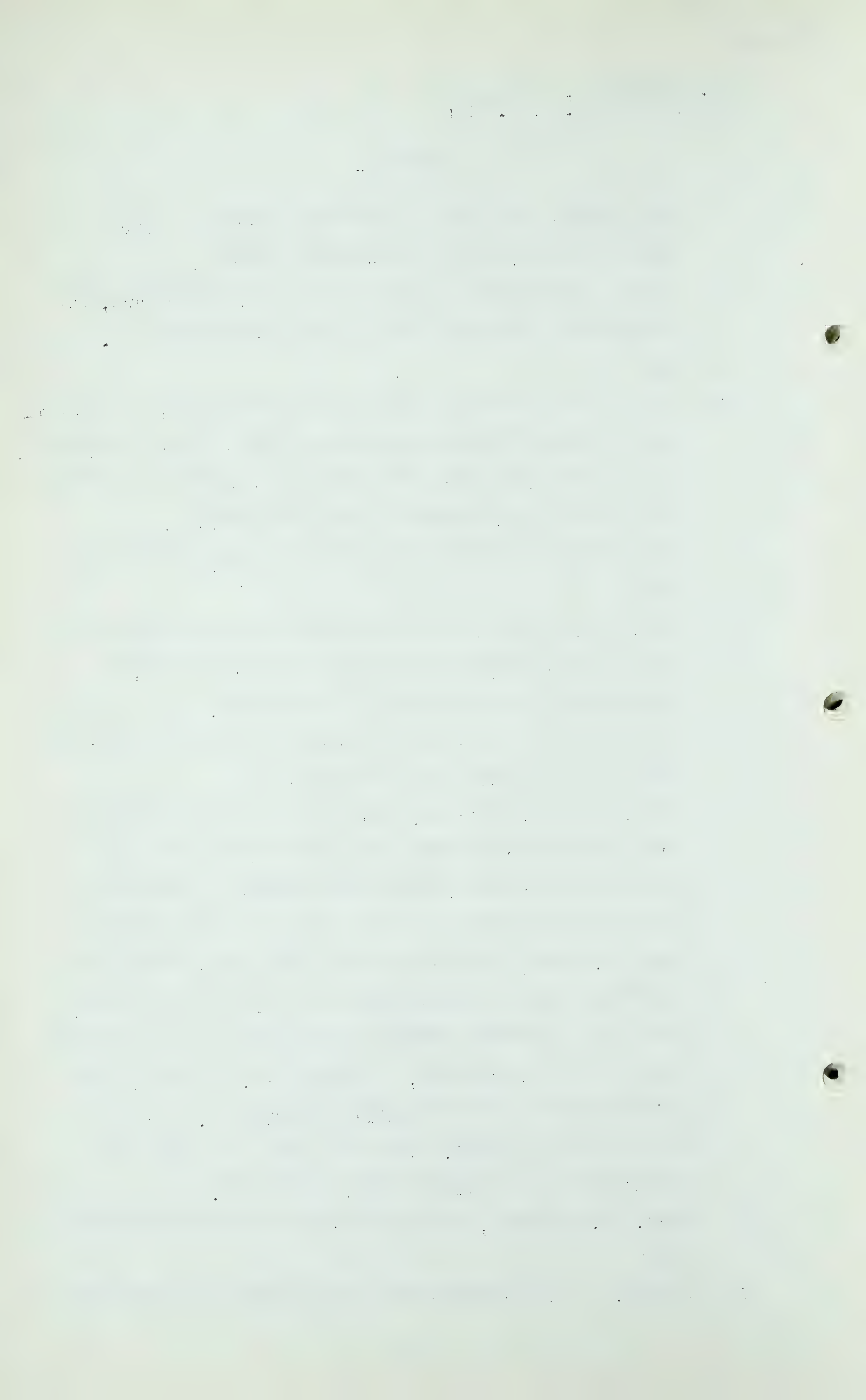
A Yes, sir, we have. We consider that any pipe supplied by any of those companies would meet the specifications required for an installation of this type.

Q Could I ask you what effect changes in economic conditions might possibly have upon field prices?

A Well, it is our opinion, from dealing with the various steel manufacturers about the pipe fittings and other basic steel products, that we can logically expect an increase in the cost of steel. It is generally known that Mr. Murray is at the present time negotiating with the United States Corporation for an increase in wages. This will ultimately result in an increase in the cost of basic steel or, at least, it always has, so that in our opinion we feel that this will be reflected, not only in the costs of steel, but in the cost of labour for fabrication in all allied steel industries.

Q Well, Mr. Ricketts, would you proceed after my interruption?

A Surely. We have detailed the procedure for arriving



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at the total tonnage of pipe in the middle of page 2.
And Item 4 deals with the cost of coating materials.

Q Yes?

A And we arrive at the figure of \$712,800.00.

Now, Item 5, the installation costs, at the top of page 3, is detailed by sections and in the order of the severity of the terrain which we think we will encounter. We have divided the main line 24-inch into three segments, two of which we estimate can be installed or will require an installation cost of approximately \$9.00 per foot. This is an extremely high figure, but the terrain is extremely difficult, and is full of rock, and will require considerable blasting and unusual operation, not only for the preparation of a right-of-way, but for installation.

We have 187 miles of what we think will be very good going, average at least, and we have included that at \$4.50 a foot. The same way with the 18-inch, 16, 12 and 10. And that gives a total figure of \$19,303,000.00.

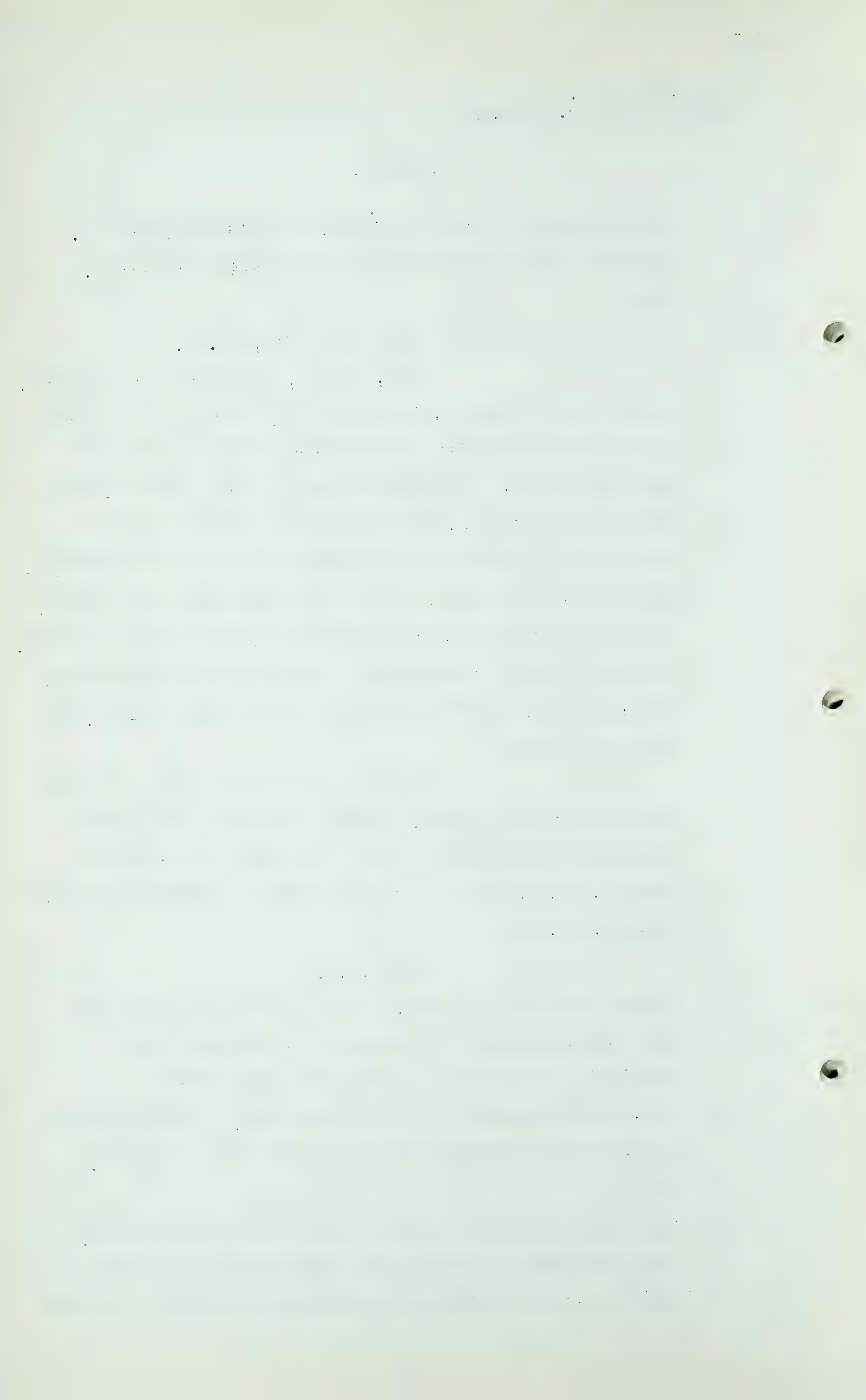
Item 7. . .

Q Before you come to Item 7, could I ask you whether you have had experience in relation to differing types of terrain in which gas pipe line was being laid?

A Well, in laying 2400 miles of pipe lines, I believe that we have almost encountered most every type of terrain.

Q Yes?

A And these figures are based on that type of experience. They are actual installation costs adjusted for what we think the price differentiation would be between the time



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of the installation and say now.

Q Yes?

A Item 7 is our detailed explanation of our estimated costs for highway and railroad crossings. On the 24-inch pipe we estimate that the average cost for the 46 crossings, which we have taken from maps, will be approximately \$38.50 a foot. Each of the crossings are estimated to be 100 feet long. That is, the average of all crossings will average 100 feet. Our total cost for that item is \$314,000.00.

Our main line block valve installations are, as shown under Item 8, at the bottom of page 3, and they include, for instance, a typical 24-inch lock valve installation, including one 24-inch valve and two vent or blow-down valves, 8-inch in size. This would be a prefabricated installation, with 24-inch by not less than 3/8 stubs welded to either end, approximately 10 feet long, and would be lowered in place as a unit and welded into the line. Our unit cost is \$9,380.00 for that, and the total cost for all block valves is \$285,000.00.

On page 4 is a typical detail of cathodic protection units which we assume will be required, and the total cost is \$62,100.00.

And then we show the details with regard to cleaning, purging, blowing and testing, and that is shown at a total cost of \$257,900.00, with the cost of the individual segments by size.

Our lateral lines are detailed for the total cost of each lateral, amounting to \$3,924,000.00.

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That does not include a detail of all the items shown on the summary of page 1. It does take us through Item 13.

The compressor stations, Item 14, a total of 9,680 horsepower to be installed, and we estimate that the cost of installation will average \$250.00 a horsepower, giving us a total of \$2,420,000.00. That estimate is based on the experience of having just completed a single installation of some 280,000 horsepower on the Trans-Continental line, and something like 20,000 horsepower for the New York State Natural Gas Company, and somewhere on the order of 45,000 horsepower for the Texas-Illinois project.

Item 15, meter stations, we estimate \$150,000.00 will be required. At the time that this estimate was prepared, Pacific Northwest were unable to tell us exactly how many customers there were that we might be required to make sales metering connections to. Our detail in the summary shows 10 with a unit cost of \$15,000.00, and a total cost of \$150,000.00. That is a figure that might be increased, or might be decreased. The unit cost might not be \$15,000.00, but the 10 is an average-sized meter station and the \$15,000.00 is an average cost, according to our experience figures, for a meter station of average size. If it was a very small station it might be only a few thousand dollars, and if it is a very large one it could be, the cost could be considerably more.

Item 16, Land in Fee, \$75,000.00. That

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is the equivalent of 300 acres at \$250.00 an acre. We feel that that will provide adequately for the purchase of the compressor station sites and all meter station sites. The compressor stations will probably average on the order of 20 acres each. It may be more. It may be necessary to purchase as many as 60 or 80 acres for a single station, depending on local conditions. Meter stations will be very small, maybe as much as half an acre, and maybe as much as an acre, depending on local conditions and locations. Anyway, we feel that the \$75,000.00 is a figure that is adequate for that.

Employee housing, and we are provided with 45 units at \$12,000.00 a unit, making a total of \$540,000.00. And the 45 units are chosen as a reasonable number of housing units to install for adequate operation both for compressor stations and pipe lines in the area through which the main line and lateral lines will traverse. A more detailed investigation with regard to this project at the time when it becomes a reality may raise or lower that figure.

MR. S. B. SMITH: I just wonder, sir, if this perhaps might not be a logical time to have our adjournment?

THE CHAIRMAN: Yes. We will adjourn for a few minutes.

(Hearing resumed after short adjournment).

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Q I think, Mr. Ricketts, you were about to turn to the engineering cost study, summary, Prairie Transmission Lines, commencing at page 5?

A Yes, sir.

Q Would you deal first with that summary?

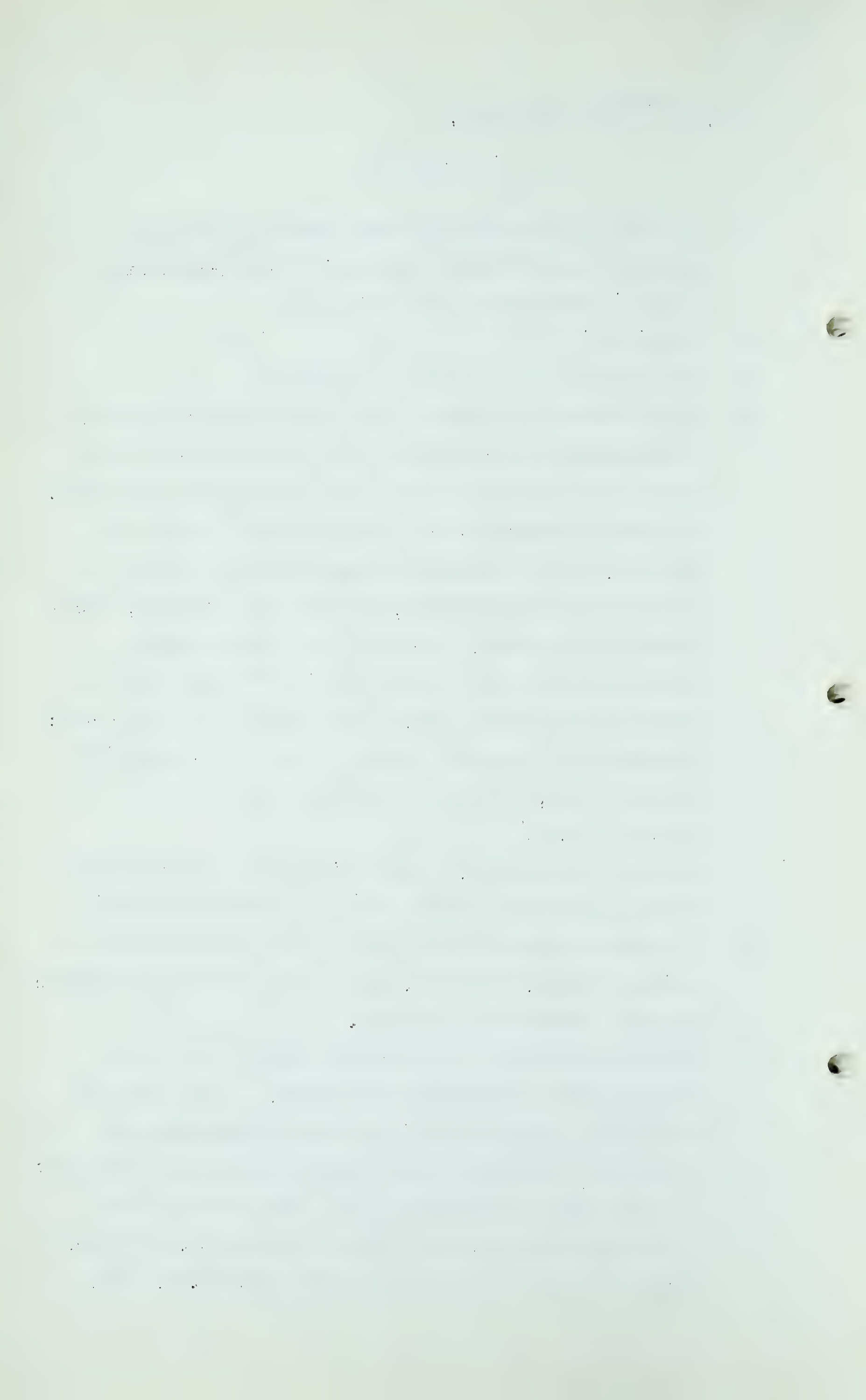
A Page 5 details a summary of our estimate of the Prairie Transmission Lines' costs. It has been prepared on the same basis as the one I have just discussed and described. Our total estimated cost of the physical facilities is \$24,764,000.00; the general plant facilities consisting of communication equipment, furniture and fixtures, transportation equipment, operating tools and equipment, including spare parts is \$300,000.00. We have included Canadian duty at \$798,800.00; contingencies at 5 per cent; engineering 5 per cent; interest during the construction at 5 per cent, and arrived at an over-all cost of \$29,871,900.00.

Q And that is prepared, I suppose, generally upon the same basis as the same summary which you discussed earlier?

A The same comments are applicable to the detail, and the summary sheets, of course, apply to the Canadian facilities as have already been discussed.

Q Is there anything you particularly desire to point out on the detail engineering costs study, or with what explanations you have given, are they self-explanatory?

A I believe that they are self-explanatory in most instances. I would like to say that on page 7 the section of main line described as Pincher Creek to Canadian-U.S. border, 24-in O.D., 260 miles, cost per mile \$47,520.00, total



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\$12,355,200.00. The experience in that section of line -- our survey of it has been rather detailed -- there is some very difficult terrain for pipelining and we also encountered some very good terrain. The \$47,500.00 per mile is equivalent to \$9.00 per foot installation cost. We think that is an adequate and reasonable average figure for the entire 260 miles of that section of line. The \$9.00 does not represent the maximum it might be completed for, installation cost in that segment of line, nor does it represent the minimum. It is what we think will be the average.

The Canadian duty that we have included, I would like to discuss that briefly because it is somewhat different than will appear in a second exhibit which we hope to present here in a few minutes, and is approximately 10 per cent of the value of the materials on which we think duty may be claimed. My information given to us by officials of the Pacific Northwest and from information which we have been able to develop by discussing it with various departments of the United States Government, such as Commerce and so forth, we feel we will be able to negotiate a figure of \$798,000.00, in that order. That is our estimate on that and how we arrived at it.

I believe that the rest of the information given in this section of the exhibit is self-explanatory.

Q Well, then, would you turn, Mr. Ricketts, to page 9 and deal with your summary of total investment at the fifth

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year and tell us what your opinion is as to the adequacy and reasonableness of the figures there shown?

A Page 9 is a summary of our estimate of construction costs as between the first and fifth years. Our clients have advised us that the initial capacity of the system will be 200 million cubic feet per day and at the end of the fifth year they anticipate an increase to 300 million feet per day. Page 9 deals with the United States' portion of the investment. We do not propose to change any of the pipeline facilities, they will remain the same. We do propose to increase the capacity by adding 22,880 compressor horsepower at \$250.00 per horsepower for a total of \$5,720,000.00. That is divided and allocated as shown on the second map and the circles which are dashed to show future compressor stations. We have taken the same contingency, engineering, supervision and interest during construction as shown for the initial phases of the construction and our total cost for this segment of the work is estimated at \$6,606,000.00.

Continuing the same plan of operation on page 10, which represents the additional construction required to increase the Canadian portion of this system from 200 million cubic feet a day to 300 million cubic feet per day capacity, including the field lines, we have shown the detailed construction costs, estimated construction costs, of course. The added gathering lines, \$10,478,000.00, which are detailed at the bottom of the page. We estimate that we will add a compressor station of 5,280 horsepower at \$250.00 a

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horsepower and on the Canadian section of the main line there will be 18,480 horsepower added, all at \$250.00 a horsepower. We have allowed for an estimated Canadian duty on these facilities and contingencies at 5 per cent, engineering and supervision and interest during construction at 5 per cent, resulting in a total estimated additional cost of the Canadian facilities at the end of the fifth year of \$19,916,000.00.

Q And there is more detail as to what the added gathering lines consist of towards the bottom of page 10?

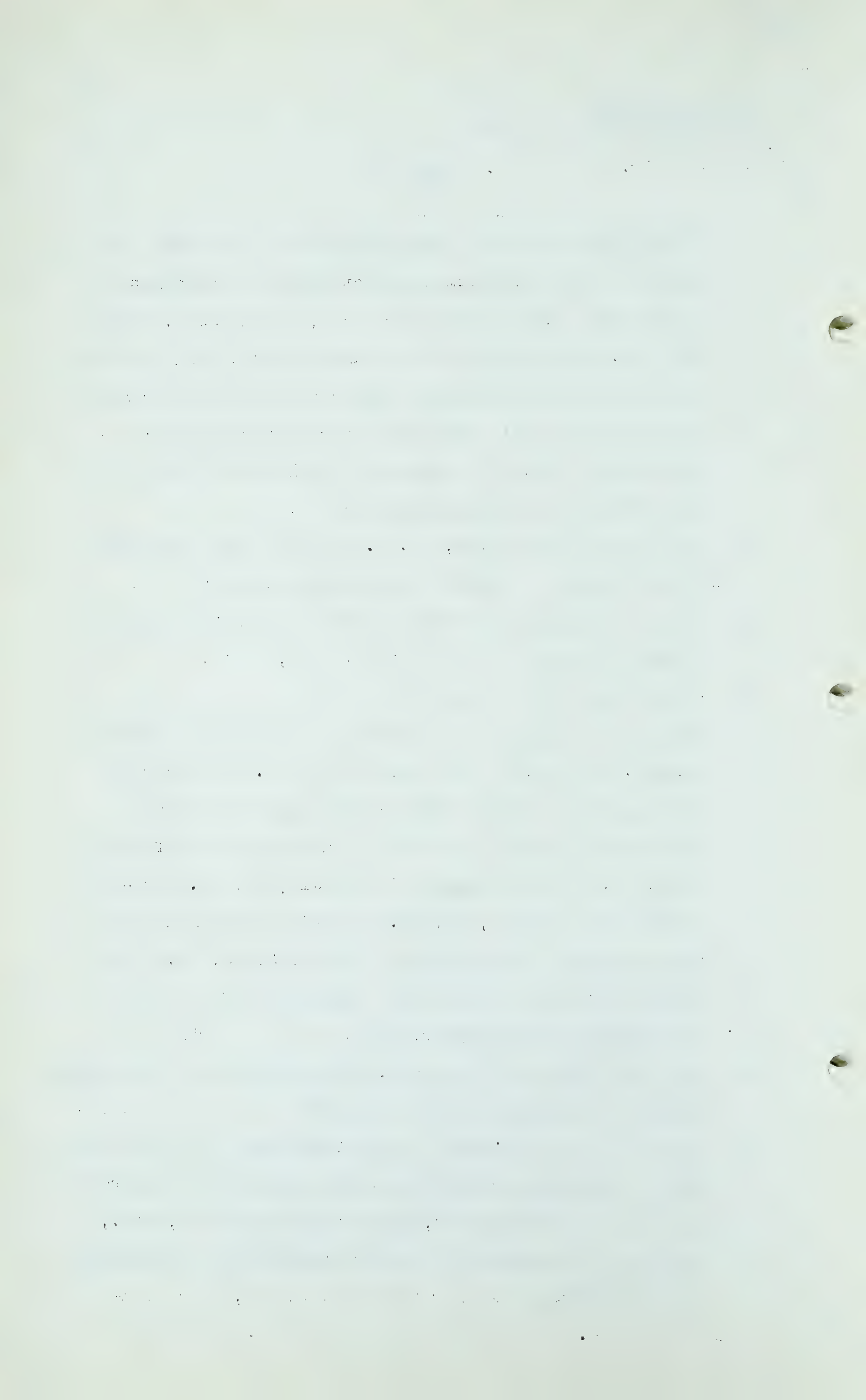
A Yes. I believe I referred to that. Now, that figure is brought forward.

Q We are back now to page 9?

A To page 1. Page 9, I am sorry, not page 1. In order to obtain the over-all investment cost at the end of the fifth year we carried forward from page 1 a total of \$84,528,000.00 and have added in the \$19,000,000.00 required here and the \$1,000,000.00 working capital and we arrive at a total investment cost of \$112,052,000.00 for the entire facilities as laid out on our first map at the end of the fifth year, including that portion represented by the dashed lines.

Q And what have you to say as to the adequacy and reasonableness of the figures shown on page 9?

A Based on our experience in both performing the field work and in purchasing materials, doing the engineering, etc., it is our opinion that those estimated costs are both adequate and reasonable for the installation, as contemplated herein.



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Q Would you turn now, Mr. Ricketts, to page 11, headed "Economic Costs Study, First Year", and deal with that and subsequently deal with the economic costs study for the fifth year appearing at page 12.

A Included in our assignment was the preparation of an economic costs study for the purpose of developing the cost of service. As previously discussed, we have a total plant investment of \$85,528,000.00. We have set down the operating costs which we feel are reasonable and adequate and represent what might be encountered for the first year of operation as is shown. For example, the compressor stations are estimated on a basis of \$16.00 per horsepower operating cost plus fuel, which is the last item. Pipelines are estimated on the usual basis. We come out with a total of \$991,000.00, adding to that our administration, local taxes, depreciation and income tax, which I would like to make a correction of a typographical error, it says, "Federal Income Tax 3.8%". That should read, "Federal Income Tax at 52%".

Q Does that include Canadian income tax?

A That does include Canadian income tax, yes, sir. Of course, these are estimated figures.

Q And by the way, could I ask you also, your administration and local taxes, depreciation, income tax and return, are shown only under column 100%. They are, I understand, common to all four columns of 100%, 90%, 80% and 70% load factors, are they not?

A Yes. We have considered that those costs do not vary where the figures do not recur. For example, the only

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costs we have taken credit for being reduced as a reduced operating load factor is the fuel consumed by the compressor units. All other costs remain the same.

Q And are common to all four columns?

A And are common to all four columns. The rate of return of $6\frac{1}{2}$ per cent was specified by our client and it is included as such at \$5,559,000.00. We estimate the cost of service on 100 per cent load factor for the first year would be 18.55 cents varying to 26.35 cents, as shown for a 70 per cent load factor. To this would have to be added the cost of the gas at the delivery point, which in this particular case is the Pincher Creek field.

Q Now, you turn, I take it, to the fifth year economic cost study on page 12.

A The fifth year was prepared on the same basis and the comments and discussion of page 11 apply to page 12 with the necessary correction in figures, also the typographical error of 3.8 per cent should be revised and changed to 52 per cent. Our total income on 100 per cent load factor for 300 million cubic feet of gas should be \$19,024,000.00, or a cost of service of 17.37 cents per Mcf. at 100 per cent load factor, following, as shown, upward under a 70 per cent load factor to 24.43 cents per Mcf. A comparison of sheets 11 and 12 will show the difference in cost of service due to the larger quantity of gas delivered.

Q You will turn now, I take it, to the next submission which deals with marketing, engineering and economics study of the proposed cost facilities to serve Eastern Canada, and that, sir, I take it, will become Exhibit 99.

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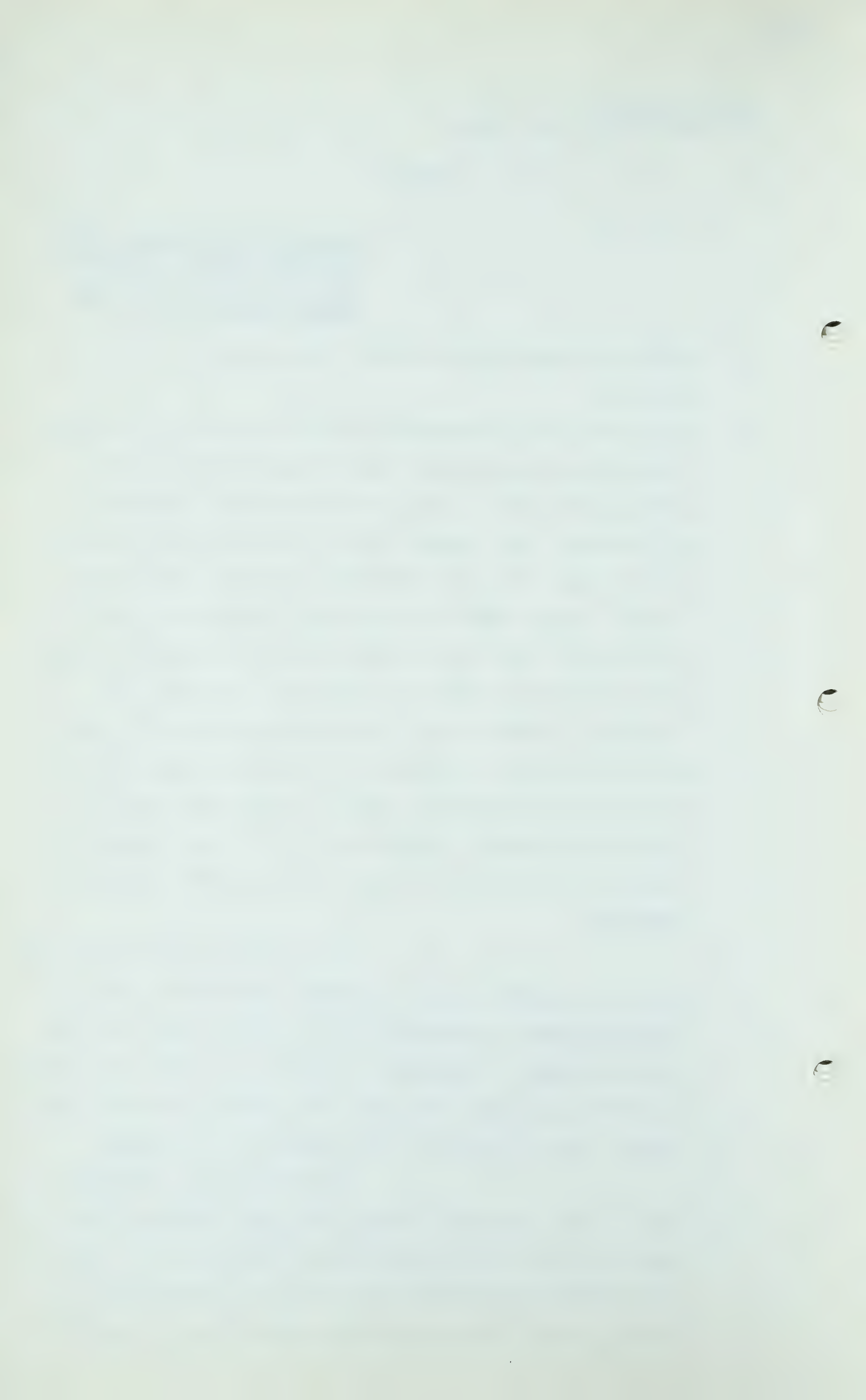
MARKETING, ENGINEERING AND
ECONOMICS STUDY OF PROPOSED
GAS FACILITIES TO SERVE
EASTERN CANADA PUT IN AND
MARKED EXHIBIT No. 99.

Q Would you summarize and explain this submission, Mr. Ricketts?

A Exhibit No. 99 is presented to show the installation of a transmission system which would accept delivery of 250 million cubic feet of gas per day at Windsor, Ontario, and transport that amount of gas to various points along the line and terminate at Montreal, Quebec. If you will turn to the map entitled "Route Map, Prairie Pipelines Limited", we have shown in this diagram the proposed route of the line, the location of compressor stations, of laterals of various towns and communities along the line, and in general how it would be routed across the southern tip of Ontario and finally arrive at Montreal, Quebec. I believe the map is self-explanatory for the purposes of describing this exhibit. The main line is 24-inch in its entirety.

Turning now to the first page, which is a summary of the estimated construction costs of a system designed to carry 250 million cubic feet of gas per day from Windsor to Montreal, I believe the detail as shown is self-explanatory. We might just review the various main phases, main segments, of the facility as described.

We have 103,500 estimated tons of pipe required, Canadian duty and taxes on pipe, compressors and other facilities at \$3,106,000.00; estimated freight at \$4,634,000.00; main line installation at \$12,440,000.00; river crossings at \$500,000.00; highways

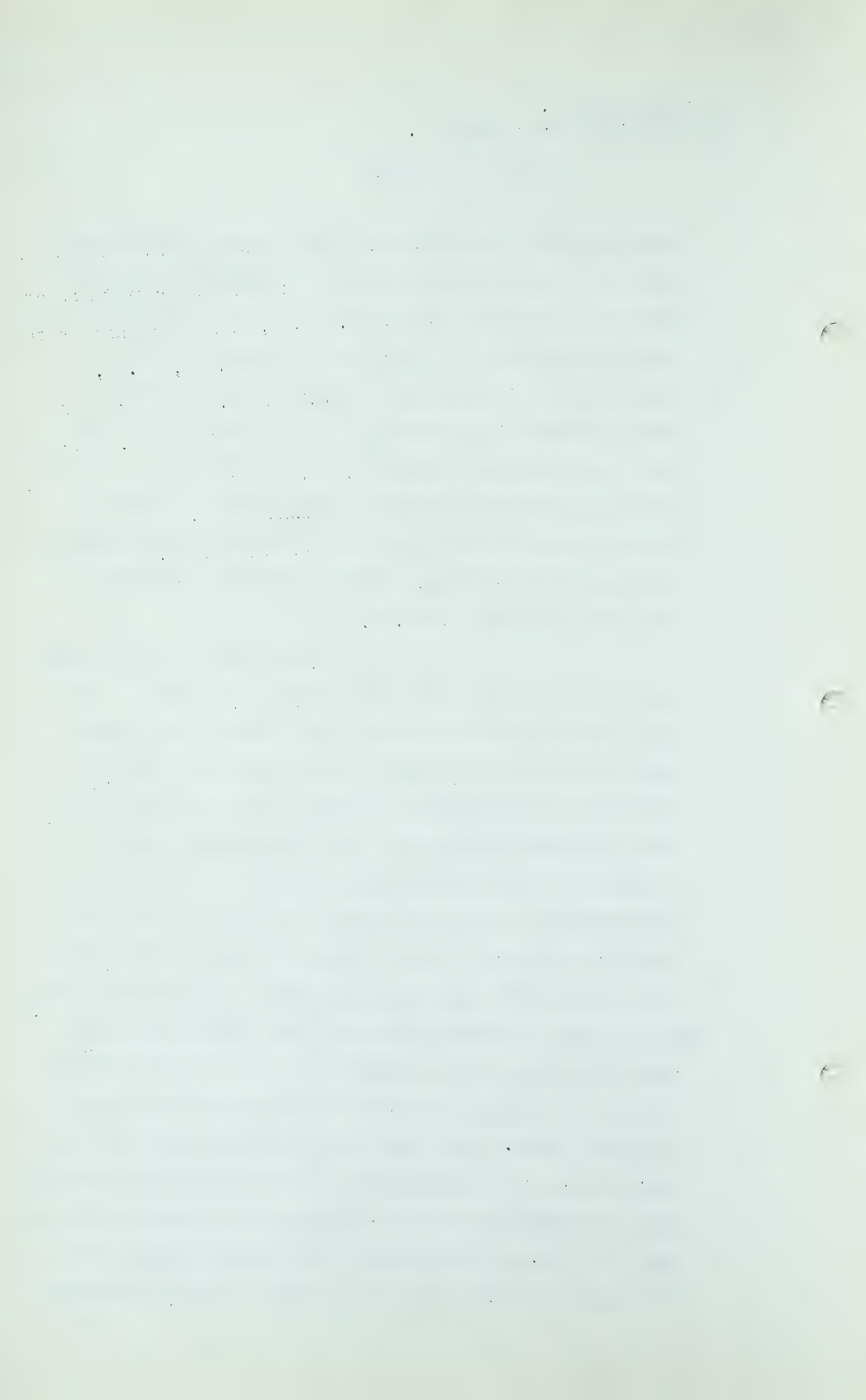


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and railroads at \$193,000.00; block valves and compressor stations side valves, \$356,000.00; compressor stations at \$225.00 a horsepower, \$2,970,000.00, and so on through the detailed portion to a total cost of \$45,361,000.00, a contingency of 5 per cent of \$2,307,000.00, a total of \$47,668,000.00; engineering and supervision of 6.3 per cent which results in \$3,000,000.00 for the same operations and work as described under the Exhibit 98. Interest during construction at 5 per cent, \$2,383,000.00; working capital at \$750,000.00, a total investment or estimated rate base of \$53,801,000.00.

Passing over the second page and going directly to the page number 1, we have a breakdown of our facilities which is in slightly more detail than the others presented. You will note that we have allowed in our pipe for a 5 per cent mill tolerance, which was not shown in detail in the other exhibit, and for a 3 per cent terrain deviation as compared to an average of approximately 4 per cent terrain deviation in the other exhibit, and which I do not think is shown in the written information. We have again used \$140.00 per ton for steel, which has been discussed previously under Exhibit 98. Our Canadian duty and this installation of lines in Canada is placed on a slightly different basis and for a slightly different reason. We have used a Canadian duty of 20 per cent, which, from discussion with the United States Department of Commerce and some officials in the Canadian Government in Ottawa, we understand would be the maximum that we might encounter, so we have shown the maximum Canadian



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duty on pipe, that is, duty and taxes, of \$2,898,000.00.

We consulted with various compressor manufacturers engaged in the shipping of compressor equipment in Canada and finally resolved on the figure of $17\frac{1}{2}$ per cent and the dollar value of equipment as being the maximum which might be charged for this operation, and that is \$208,000.00, or a total of \$3,106,000.00. It is our opinion that negotiations can be made which will reduce that figure. It is our understanding that the project, an industrial property which is to the advantage of the Canadian people and which is for the benefit of the public in general, that the Canadian Government takes that into consideration when imposing duties and taxes.

Our freight rate in this particular case entitled "Item 1-B, Freight on Pipe", has been resolved for the same reasons, in order to arrive at a figure which might be the maximum that would be expected. Investigation shows that if all the pipe for this particular project is shipped from the farthest reputable or usual manufacturing source of pipe, which is the West Coast, the average freight rate from either Kaiser or the Consolidated, would be in the order of \$44.70 per ton, or a total figure of \$4,634,000.00 on 103,000 tons of pipe. We believe that if the United States Government's approvals are made for the pipe for this system that all the pipe will not come from the farthest manufacturing point, that there will certainly be some, or a portion of it, will come from closer points

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such as Lorrain and the Pittsburgh area, which would also favourably affect the cost of the service of the project.

On page 2 we have detailed our installation costs, estimated installation costs of the pipeline system, and we have arrived at an average cost, and again the figure of \$4.00 for average installation cost, in which most of this area is average terrain, it is not mountainous, it is gentle rolling country, mostly agriculture, some wooded, some marshes and some swamps, but we estimate that the figure shown at the bottom of page 2 of \$4.00 per foot will be an average figure for the entire 24-inch system. We have detailed the summary of river crossings, main line and railroad crossings, on page 3, and again have used the figure for river and stream crossings of \$100.00 per foot, and the highway and railroad crossings at \$38.50 per foot. I believe that the detail of the other items is self-explanatory and the figures at which we have arrived are reasonable and adequate for the system which is contemplated in Eastern Canada for the Prairie Pipe Lines Limited.

Q Mr. Ricketts, you were discussing freight rates and duty, customs duties, and the possibility of steel coming from points closer to the places where the pipe is to be used. Have you made any computations that reduce the customs duties and reduced freight charges?

A Yes. We have prepared a summary which shows the effect on the over-all investment cost if certain things happen. If you would like, I would be glad to give you the benefit of our estimates on that.

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Q Generally, what were the results, without going into too much detail?

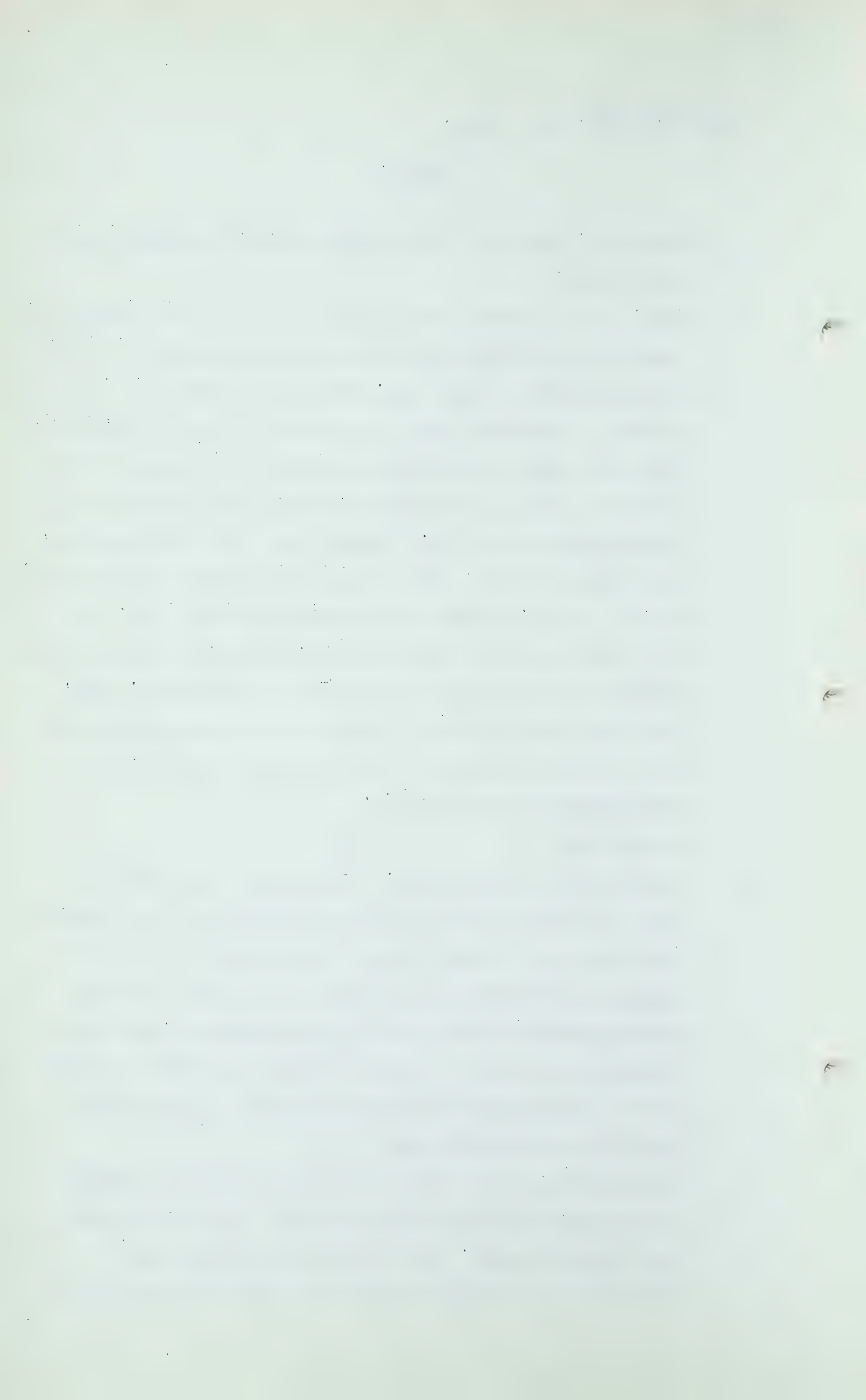
A Well, let us assume first of all that only half of the pipe comes from the California manufacturers and half of it from the Lorrain-Pittsburgh area, and let us assume that we will be able to negotiate what we understand is the minimum duty and taxes with the Canadian Government at a figure of $7\frac{1}{2}$ per cent, which, as we understand it, would be the best you could possibly hope for. Taking those into consideration, both items, that is, the freight rate would be reduced from \$44.77 to \$18.74 from the Lorrain-Pittsburgh area. The net result would be a saving of \$3,283,000.00 on the capital investment required for the over-all installation. Now, that would have an effect on the cost of service, which we have not yet discussed on this particular project, of approximately $\frac{1}{2}$ cent per Mcf.

Q A reduction?

A A reduction of half a cent. Of course, I would like to point out that we have no way of knowing that those assumed conditions will be met, either with respect to all of it coming from the West Coast or all, say, coming from the Pittsburgh-Lorrain area, but we have presented, and when we come to the cost of service, it will show what we think will be the maximum figure that might be encountered for the cost of service of gas.

Q Mr. Ricketts, could I ask you how you propose to install the pipeline facilities, and by that, I take it is meant the pipeline itself. Do I correctly describe that?

A You mean, the physical arrangements, how we would propose



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to go about that?

Q Yes.

A We would propose, under our deal with Pacific Northwest and Prairie Pipe Lines, to do all the actual construction work with regard to compressor stations, meter stations, dehydration plants, if required, and physical facilities of a planned nature, to install those with our own forces. We would propose to do all the engineering work, purchase all of the materials, all allied general home office work with our own forces. The installation of the pipelines, we would propose to sublet that to pipeline contractors, experienced and qualified, with the adequate personnel and equipment for doing that on a unit cost basis.

Q And have you had experience in subletting work of that type?

A Yes. The entire Trans-continental Pipeline facilities were sublet on a similar basis. It is normal procedure in the laying of cross-country pipelines to follow that method or the method as outlined.

Q In the result, then, I take it that the installation of the pipeline itself would be all that you would propose to sublet?

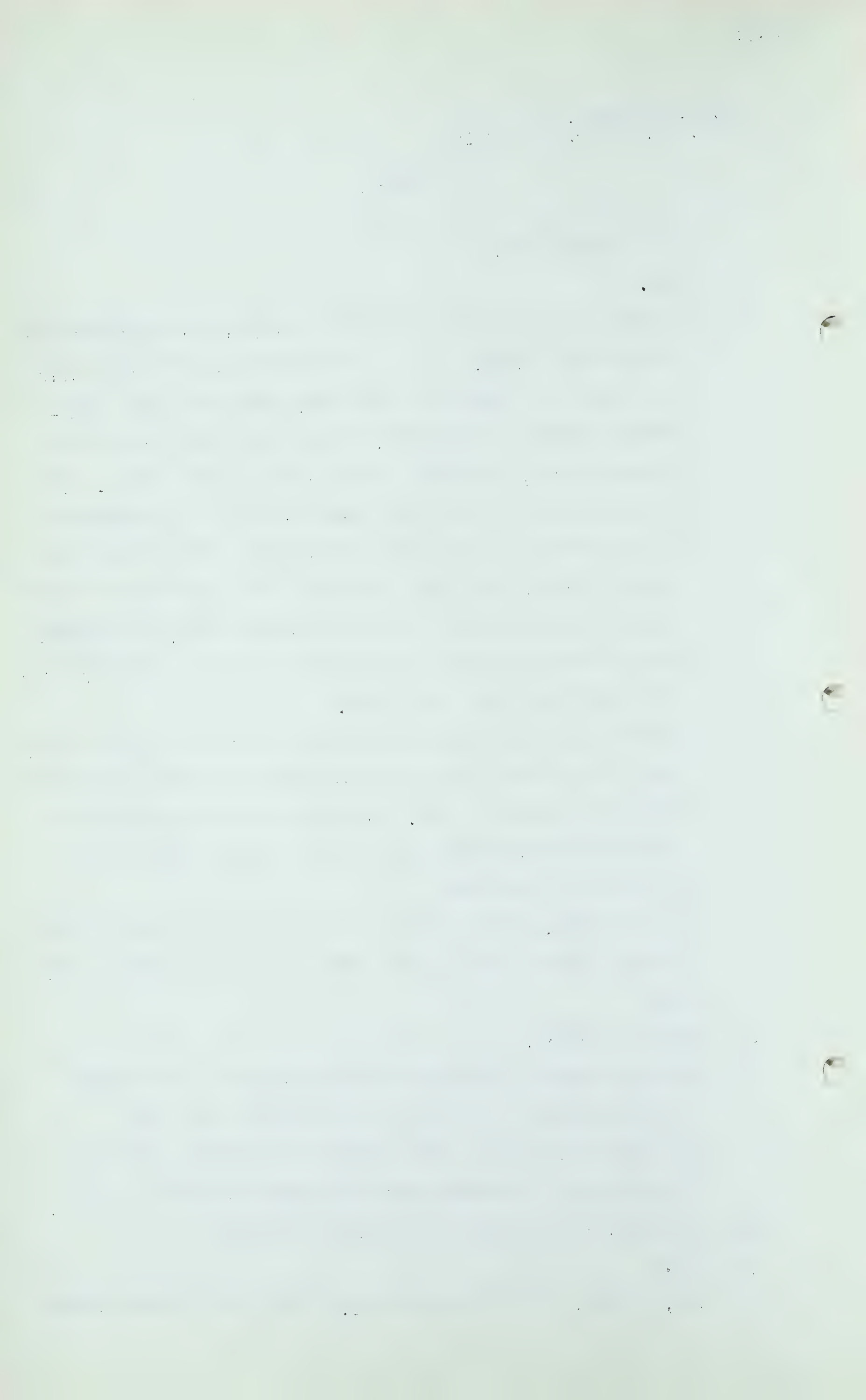
A That is correct.

Q Have you taken into account in the estimates and figures you have given us here as to construction costs the probable subletting of the construction of the pipeline facilities in the manner that you have described?

A You mean, with regard to the over-all cost?

Q Yes.

A Yes, I have. We estimate the \$4.00 per foot average figure



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would be the average cost to the company.

Q No matter who the contractor might be?

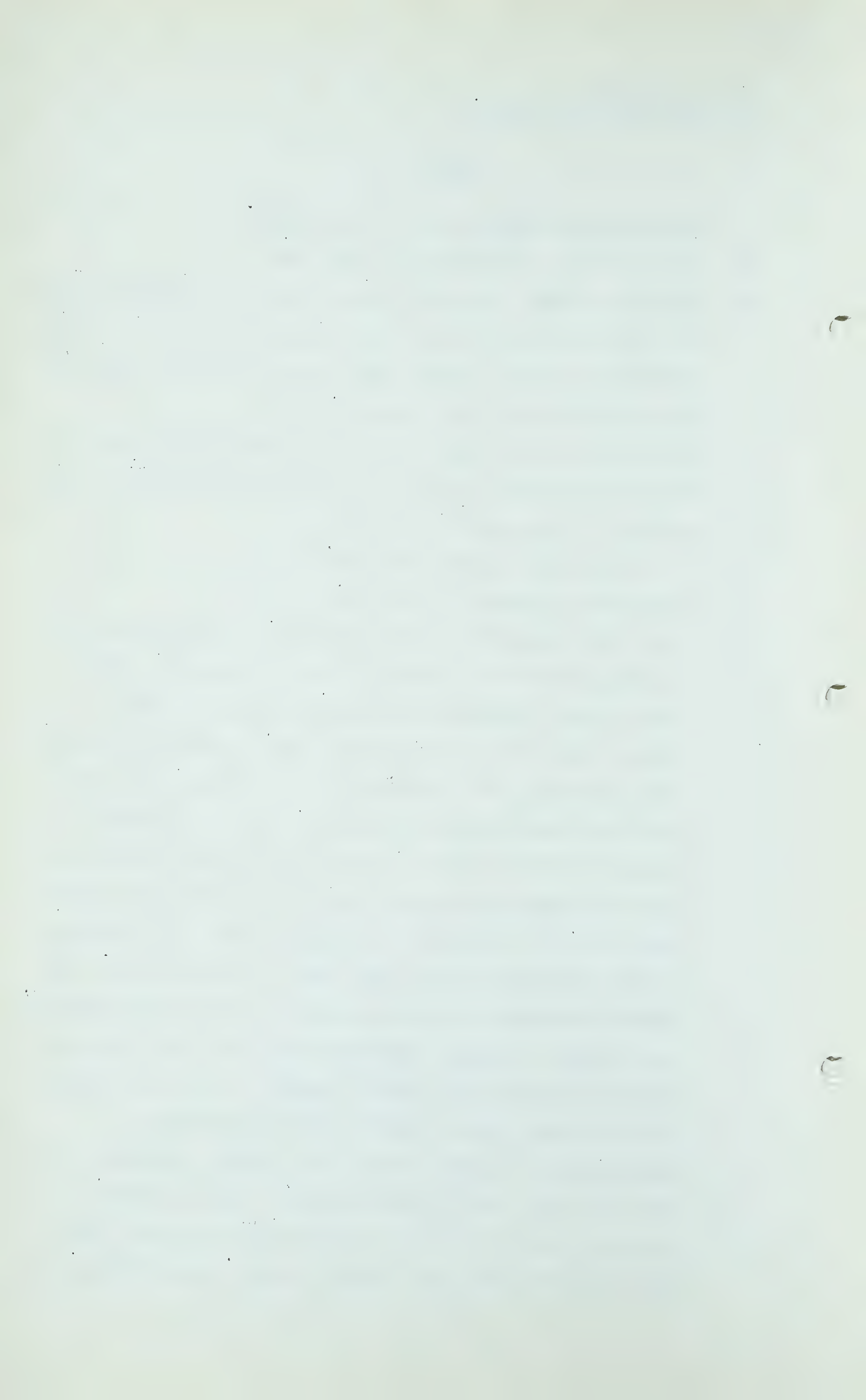
A That is correct. In other words, pick a reputable contractor and he would bid each of the various portions on a lump sum basis, and you merely would multiply his unit cost by the number of units he installed.

Q By the way, do you want to go back to the second sheet in Exhibit 99 and tell us what the cost of service is? I am sorry, it is on page 2, I think.

A It is the second unnumbered page.

Q The second unnumbered page, yes.

A Our client included in our assignment, as in Exhibit 98, the request that we arrive at a cost of service. Here again we have taken the planned cost based on a 250 million cubic foot per day sales load, estimated the operating costs as shown in summary of operations, including pipeline operation and maintenance, pressure station operation and maintenance, meter and regulator operation and maintenance, communications, and the fuel at 32 cents per 1,000. The 32 cents is a figure given us by officers of our client and we have used that on their advice. The general and administrative expenses as shown, depreciation, local taxes, estimated Dominion income tax, and a rate of return of $6\frac{1}{2}$ per cent, which is again a figure set forth by our client, and our total service cost adds to \$9,120,000.00 for 100 per cent load factor operation. This is a net cost of service of 9.99 cents per Mcf. Varying costs of service at 90 per cent and 80 per cent are 11.02 cents and 13.31 cents per Mcf. respectively.



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Dir. Ex. by Mr. S. B. Smith.
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Q Yes?

A I believe that the method of arriving at the details is self-explanatory, as shown on the second numbered page which we have just discussed.

Q Would you answer my friend, Mr. Ricketts?

MR. C. E. SMITH: Before you sit down, Mr. Smith, on that same page there is 730,000. Should that not be corrected?

MR. S. B. SMITH: Yes, I am sorry, that should be 73,000 instead of 730,000. It is a misprint.

Q Is that right, Mr. Ricketts?

A Yes, that is correct. Under the 80% load factor it is 73,000, so that you should strike the last cipher.

Q Would you answer my friend, Mr. Ricketts?

A Yes.

CROSS-EXAMINATION BY MR. NOLAN:

Q I just want to ask just one thing, if I might, or two things, Mr. Ricketts, please. What formula do you use in estimating the flow of gas through a pipe line?

A We use the so-called Panhandle Eastern formula with its most recent corrections due to experiments and tests.

Q And what efficiency factor do you use?

A On a 24-inch line we use 92½%.

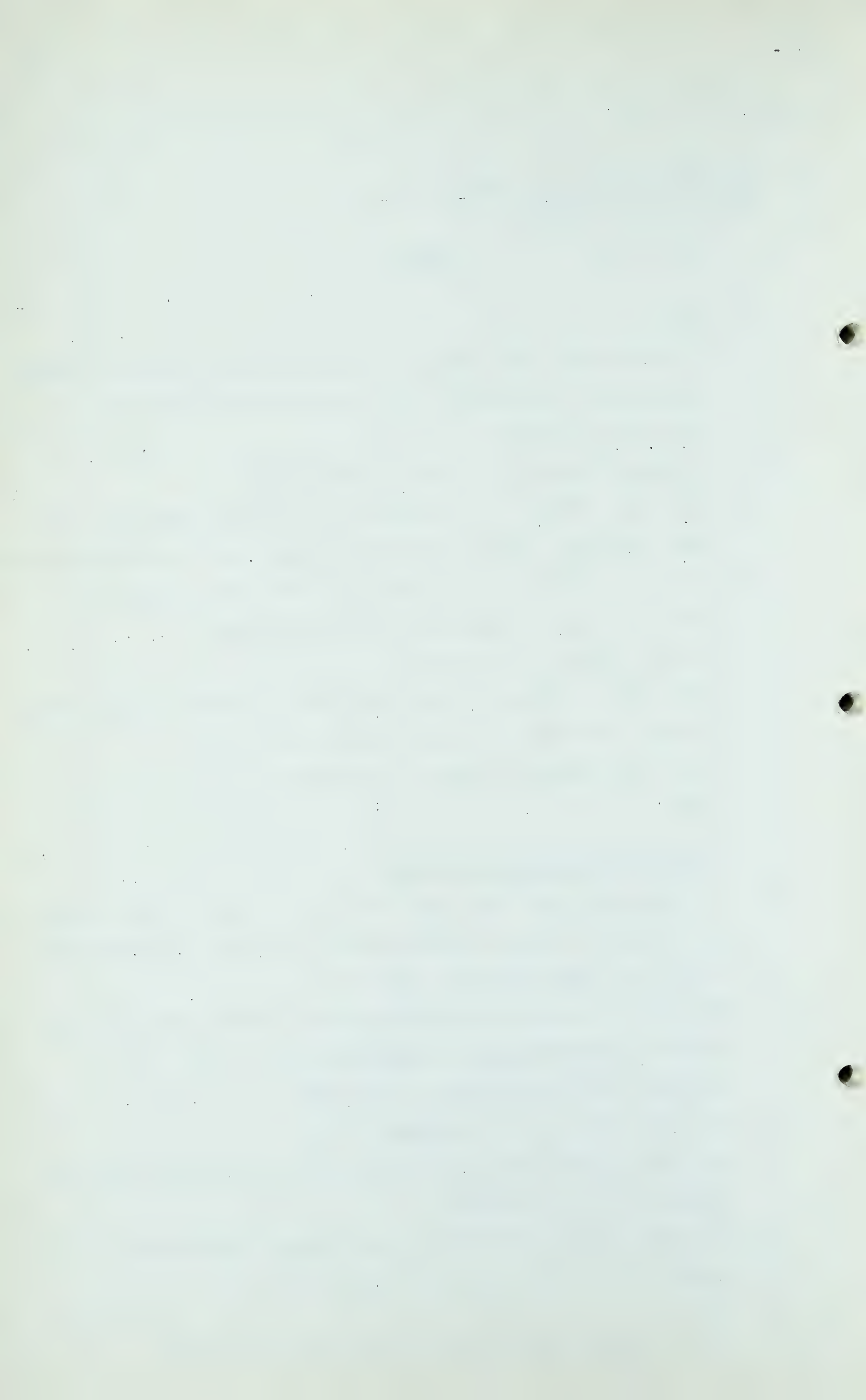
Q And that formula has been put on a slide rule all of its own, hasn't it, Mr. Ricketts?

A I assume you are referring to the Grizzle slide rule?

Q Yes?

A Yes.

Q Yes. That is the Grizzle gas pipe line slide rule?



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A Yes.

Q There was one other thing that occurred to me, in your economic study which is to affect the Western portion of your line, do you cut off the employees in the compressor stations during slack periods?

A We have not considered that the employees would be affected particularly in the Western sections, because they will probably be permanent employees of the company. There is no place where to draw local help from.

Q No?

A So that they would continue and our economic study contemplates them remaining on the payroll.

Q No cut-off?

A That is correct.

Q And there was one other thing that I wanted to ask you about, Mr. Ricketts. On page 7 of your marketing, engineering and economic study of the Western portion of this project, I observe that you have 260 miles from Pincher Creek to the Canadian-U.S. border, which costs \$47,500.00 a mile or, I think you told us, \$9.00 a foot?

A Yes.

Q That is at page 7 of exhibit 98?

A That is correct.

Q And I think you also went on to say that the \$9.00 a foot, Mr. Ricketts, was not a maximum, was not a minimum, but was an average figure for those 260 miles?

A That is correct.

Q And I think you also added that some of that terrain was, in your language, "very difficult" and some of it was good?

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A Yes.

Q Now, could you give me some description or some indication of where that terrain is very difficult? I suggest to you that it is immediately East of Trail, in the vicinity of the Nelson Range?

A That is what we consider the most difficult area.

Q And can you give me some idea of the maximum cost per foot or per mile of what you classify as the very difficult terrain?

A In my opinion, we might experience maximum costs as high as \$13.00 to \$15.00 per foot in that area.

Q And I think you also told us that the average cost per foot in the easy going, in the Eastern portion of your line, would average \$4.00 a foot?

A That is right. However, I did not consider that that was in the easy going, that was the average cost for the entire system.

Q I beg your pardon. Some of which was wooded and some of which was swamp?

A Right.

Q As you have told us?

A Yes, and some may be rock.

Q Some may be rock?

A Yes.

Q You are familiar with this Nelson Range country, Mr. Ricketts?

A I am familiar mapwise with it, yes, sir.

Q Well, that means you have not been over it, is that right?

A I personally have not been, but members of our organization have been over it in detail. And we have had the benefit of a complete report of Mr. D. McDonald Biddison, who is an outstanding authority on pipe line work. Mr. Fish has been over

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it in its entirety, and I have discussed the terrain in detail.

Q Yes?

A I believe when I say I am familiar mapwise, that that is true, but I have not been personally over the ground.

Q No, I am not critical about that at all, Mr. Ricketts, because I think you and I are in complete agreement that the bad portion of the line and the most expensive from the point of view of installation costs is that part lying immediately east of Trail in the Nelson Range?

A Yes, sir. I agree.

Q Because when you get out through the Crow's Nest Pass in a more easterly direction it is not so difficult going, in the vicinity of Pincher Creek?

A Yes, sir.

Q And there might be a cost of as much as \$12.00 or \$13.00 a foot in this bad portion east of Trail?

A I think we might encounter that high a figure.

Q Thank you very much.

CROSS-EXAMINATION BY MR. McDONALD:

Q Mr. Ricketts, would you mind telling me how many miles of this real bad going there is, roughly? Is there 260 miles?

A No, we do not consider there will be 260 miles of it. It is hard to say how much of that, until an actual survey, until your first survey party has been put through that area.

Q Well, all I wanted to know, is it 100 miles out of the 260?

A I would say it certainly would be less than 100 miles.

Q You do not know?

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Cr.Ex. by Mr. McDonald.

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A No.

Q Is it 50 or 60? You do not know whether it is 50 or 60?

A No.

Q I was just trying to recollect whether the Nelson Range is not just between Trail and Creston?

A I cannot answer that, just where the Nelson Range exactly begins and ends.

Q There was one other matter, sir, with regard to the matter of freight. On page 3 of exhibit 98 -- no, page 4. Page 2, I am sorry, I think you told us that freight was from Los Angeles to an average point on your line, is that right?

A Is that the \$25.00 figure you are referring to?

Q Yes?

A Yes, we estimate that the \$25.00 will be the average freight from Los Angeles, say, to any point along the main line, or to points along the main line.

Q And the \$140.00 that you use for cost per ton is your estimated cost per ton at Los Angeles?

A Yes.

Q Now, if you are buying your pipe in the Eastern United States you would have a lower average cost than \$140.00?

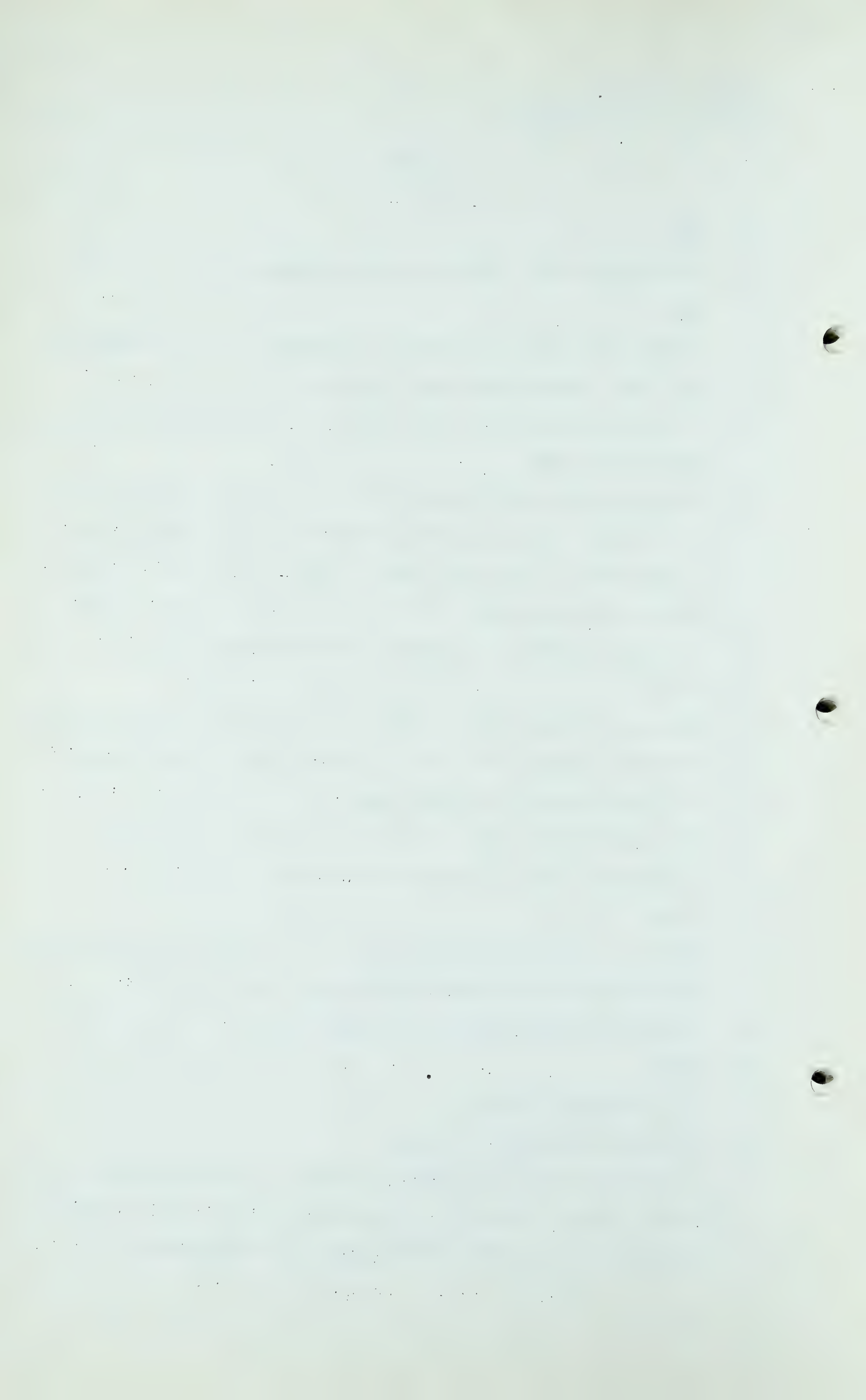
A You are now referring to pipe cost only?

Q Yes.

A Not including freight?

Q Yes, not including freight.

A I personally do not think you would. I think \$140.00 is a good figure, whether you buy it on the West Coast or whether you buy it in the Pittsburgh area or at Milwaukee.



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Cr. Ex. by Mr. McDonald.
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Q If you bought it in Milwaukee, for instance, you would have an additional freight of some \$40.00 a ton?

A Yes, that is right. Did you say additional freight?

Q In addition, your total freight would be \$40.00?

A Oh, I thought you meant in addition to the \$25.00 a ton.

Q No.

A You would have some additional freight, yes, sir.

Q And then you explain to us how you arrived at \$12.00 a ton, related to water carriage of the pipe from Los Angeles?

A Yes.

Q The only thought that I have there is that you carried that through to your installation in Canada, did you not?

A Well, let's see . . .

Q That is page 6.

A We have to. . . If you will refer to the map, you will find that a 10-inch pipe which the \$12.00 refers to is the short segment of pipe going to Vancouver, B.C.?

Q Yes?

A Which is a competitive water rate.

Q Yes, thank you, Mr. Ricketts.

CROSS-EXAMINATION BY MR. MARTLAND:

Q Mr. Ricketts, I just have a few questions, I think all related to exhibit 98. At page 1, the estimate of \$250.00 per horsepower unit cost, that will not include provision for land or employee housing, will it?

A No, that does not include either land or housing.

Q Would it be possible for you to give me a rough estimate as to what the figure per horsepower would be if you included

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those items?

A Well, I think a fair estimate of that would be to simply assume that 20 acres would be sufficient for both plant and camp.

Q Yes?

A And the average cost might be \$250.00 an acre.

Q Yes.

A I believe that I have said that the \$75,000.00 was equivalent to 300 acres, which we considered adequate, we considered the 300 acres would be adequate for the installation. Now, we have included 45 houses, and a fair figure for a compressor station under present-day conditions is 7 to 10 houses, so that you have \$12,000.00 a house. That is our estimate.

Q You work it out on that basis?

A That is the way I would go about it.

Q Now, turning to page 2, and the estimated cost per ton of pipe.

A Yes.

Q You told Mr. McDonald that is from Los Angeles, pipe from Los Angeles?

A Yes.

Q Is that a quoted price or is that an estimate which you are making in the light of increasing steel costs about which you have told us?

A I have contacted both Kaiser and Consolidated, and while I do not have a formal quotation in letter or quote form, I contacted both Kaiser and Consolidated as late as last Friday, and they advised me that their current price in large tonnages would be in the neighbourhood of \$140.00 a ton, so

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that the price checks as late as last Friday with what we have used.

Q And which mill would that be in Los Angeles, Mr. Ricketts?

A As far as I know, there is not one there. Maywood, California, which is Consolidated Western's plant, and Basalt at San Francisco, which is the Kaiser plant.

Q Well, then, if you would turn to pages 5 and 6 now, Mr. Ricketts?

A Yes.

Q The point I have in mind is the matter of the estimate for Canadian pipe. Now, on page 6 you indicate 50,608 tons of pipe? That is at the top of page 6, main line pipe.

A Yes.

Q And that is at \$140.00 per ton?

A Yes.

Q We have had evidence here recently that the duty would then be 15% and that there would be an added sales tax of 10%, with a subsequent draw-back of one-half of the duty. And working it out on that basis, Mr. Ricketts, the figure, if we included the sales tax with the Canadian duty, that figure would be substantially higher than the figure of \$798,800.00, which appears on page 5, and I wondered if you could explain that to me?

A I discussed that point, briefly, I believe, when we covered it. That \$798,000.00 represents our estimate of what we would finally be able to negotiate for. We have obtained the same information that you have described. We have obtained the information presented in exhibit 99. We put this in on what we thought we might reasonably expect as a final figure.

Q On the basis that I have outlined, and the figures that I

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have indicated, the figure for duty and sales tax would be \$1,350,000.00?

A It would be substantially more, yes, sir.

Q And last of all, and it is a very minor point, Mr. Ricketts, the map, the first map at the back of that exhibit, you mentioned in evidence the lateral line to Kimberley as being a 3-inch line, but the figure there shows $3\frac{1}{2}$. Should the map be corrected?

A No, the $3\frac{1}{2}$ is the outside diameter, and it is what is usually termed in the industry as a nominal 3-inch line.

Q I see. Thank you, Mr. Ricketts.

EXAMINATION BY MR. C. E. SMITH:

Q Mr. Ricketts, going back to page 5, and what you were just discussing with Mr. Martland, I am not sure that I understand you. I am not sure that I understand with regard to the \$798,800.00. Are we to assume that that includes the sales tax?

A Yes, sir.

Q That is the way we interpret it, in view of your explanation, is that correct?

A Yes, sir, that is correct.

Q There is no other detail with respect to Dominion or other sales tax?

A That is correct.

Q And your explanation is that this figure, or how you arrive at the figure, would probably depend on negotiations; is that a fair way to put it?

A Yes, sir.

Q I see. Now, just one or two other matters. At page 10,

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the last item, "Added Gathering Lines", starting from Brooks to C.W.N.G., and I take it that that is the Canadian Western Natural Gas system?

A That is correct.

Q And the C.W.N.G. to Pincher, Medicine Hat, and so on, where do we find anything in your maps with respect to that, or is there anything?

A The map.

Q And with regard to Countess, Cessford, etc.?

A We have Medicine Hat, Countess, Cessford, and that Medicine Hat, Countess, Cessford and so forth, that refers to Countess, Cessford, Princess and Medicine Hat as shown at the outer edge of the system in the upper right-hand corner.

Q I see those.

A And the 20-inch and the 16-inch pertains to that segment of the line between the point of confluence of the laterals and the main line going directly south to Pincher Creek.

Q I do not follow that. Brooks to C.W.N.G.?

A Well, Brooks is the point, if I may point here (indicating). . .

Q . . . where they all converge?

A Where they all converge.

Q Yes?

A That is taken as the point where they all converge.

Q What I am trying to find out is this lateral or this gathering line, Brooks to C.W.N.G.? That is some place where the C.W.N.G. crosses that line between Brooks and Pincher Creek?

A Yes, it is not shown on the map. If you care to make a note of it, there is 72 miles of 20-inch and, of course, 61 miles

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of 16, and it is roughly at mid-point.

Q That is the intersection?

A That is the intersection.

Q Of the C.W.N.G. with the proposed Pincher Creek line?

A Yes.

Q Are these costs of the added gathering lines taken into consideration in your summary?

A Yes, they are.

Q And I am going now to page 12, Mr. Ricketts, and referring to your total investment of \$112,000,000.00-odd there, and relating that first to Federal income tax, and there is there a typographical error and a correction made from 3.8% to 52%?

A Yes.

Q And I am advised, I have not done this, but I am advised that 3.8% of \$112,052,300.00 is \$4,258,000.00.

A Yes.

Q Is there any peculiar significance in that?

A It so happens that we have developed in our organization a formula for arriving at Federal income taxes without giving any particular rate of return when the rate of interest is known and the capital investment is known, and we have used the 3.8 instead of the 52 which is the income tax rate.

Q Well, I mean, the 3.8% does come out to your \$4,258,000.00?

A That is right. That is just a formula which we have developed of our own to arrive at income tax amounts.

Q And having regard to your rate of return, which is that 6.5%, you get \$7,283,400.00, I take it that is taken from your total of \$112,052,300.00?

A That is correct.

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Q Is it?

A Yes.

Q There is no depreciation, is that right?

A There is no depreciation in the first year, I believe.

Q We are really looking at the fifth year, Mr. Ricketts?

A Oh, at the fifth year?

Q Yes?

A There is depreciation taken out every year. Depreciation is considered at the rate of 3%, and a plant life is given at 33-1/3 years.

Q Doesn't your 6.5 on your \$112,052,300.00 come to your \$7,283,400.00?

A Just a minute, will you repeat that question, please, sir?

Q I beg your pardon?

A Would you repeat that question, please, sir?

Q Your 6.5% of your total investment of \$112,052,300.00 results in the figure you have here of \$7,283,400.00?

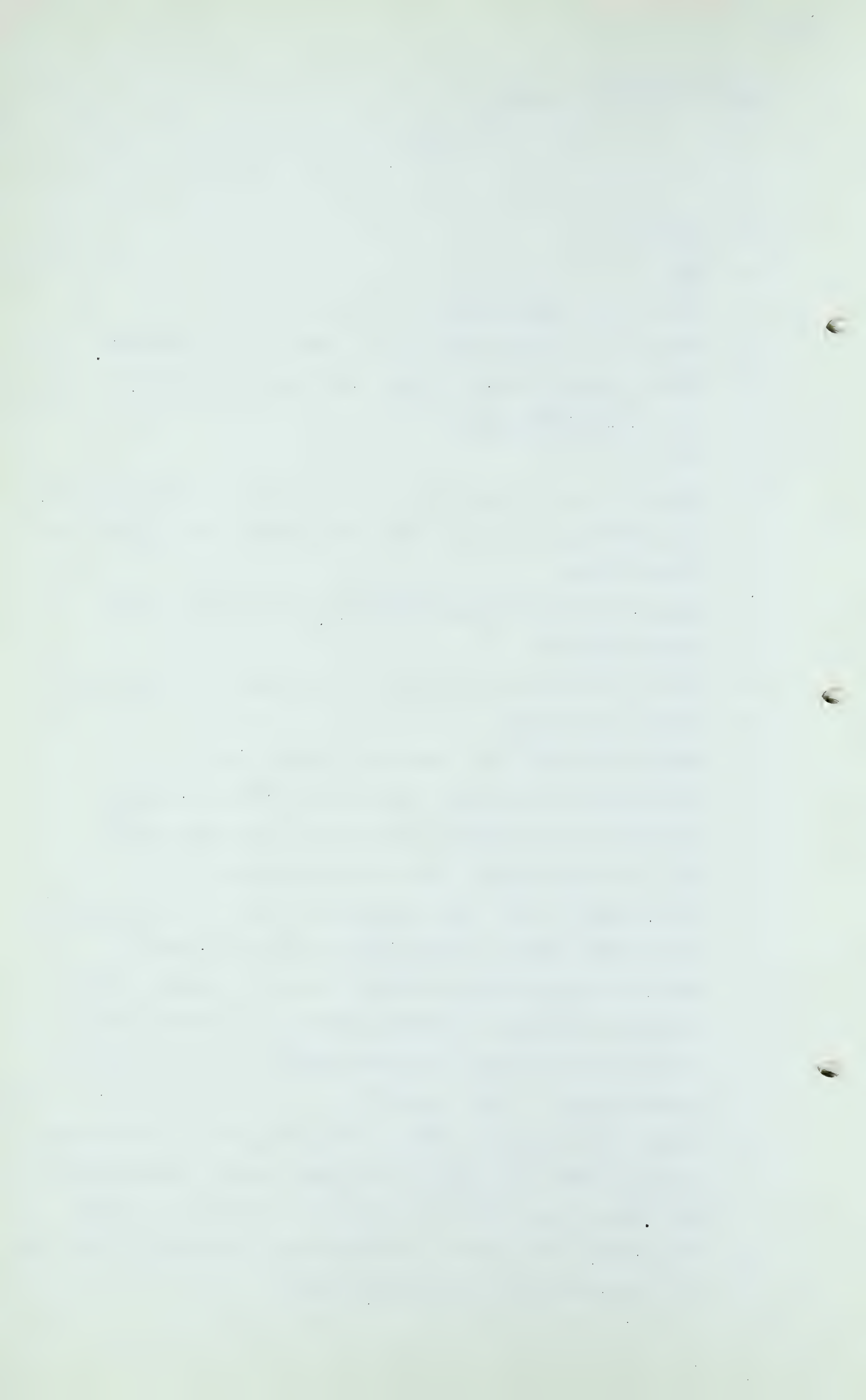
A For the investment at this particular time.

Q Well, that is what I am getting at. There is no depreciation taken with regard to your figure of \$112,052,300.00?

A Well, you are asking me whether or not the figure for the initial investment of \$84,000,000.00 was depreciated for the five years. that it was installed prior to the fifth year of installation, is that correct?

Q Well, I am not asking that. I am asking for an explanation of the figure that you have for your return, and whether it is 6.5% of your total investment shown at the top there?

A All right. We estimate that the total investment at the end of the fifth year is \$112,000,000.00?



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Q Yes?

A And that the rate of return is 6.5%.

Q Yes.

A And that is on the total investment of \$112,000,000.00.

Q Well, is depreciation taken into consideration in finding your return?

A It would be for successive years down the road.

Q You mean after the fifth year?

A Sure. This is the investment at the fifth year.

Q Is there any depreciation previous to that?

A We haven't taken into account any depreciation in the \$85,000,000.00 segment of that figure. I believe that answers your question.

Q Well, as I understand it, your \$112,052,300.00 is your original investment of \$80,000,000.00-some plus the succeeding years?

A That is correct.

Q And there is no depreciation when you take 6.5% of your \$112,052,300.00?

A That is correct. There was no depreciation, sir, in the \$80,000,000.00.

Q Now, there was one other thing that I intended to mention earlier. Probably you can tell me, Mr. Ricketts, now, your \$250.00 per horsepower at the West and the corresponding figure of \$225.00 at the East, can you explain to us wherein the difference lies?

A Yes.

Q Do you know what I am talking about?

A Yes, I do.

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Q Yes?

A The difference in those two figures is taken into account in the terrain, the density of population and so forth, that we encounter, and the very severe weather conditions that will probably exist during the construction period. In Eastern Canada we have a more densely populated area, and there are some workers to draw on. They have homes and residences in the area. We contemplate that construction in the State of Washington area and in lower Alberta will probably require the establishment of barracks and a mess to take care of the men, and we have allowed \$25.00 a horsepower for that, plus the more severe weather conditions, and the antifreeze installation, you might say, that will be included in the design in the colder regions.

Q I take it, Mr. Ricketts, \$25.00 is an experience-plus-judgment figure?

A That is correct.

Q Would that be a fair way of putting it?

A Yes.

Q There is no other way of arriving at it?

A No other way.

Q Now, just one more question about this, referring to your \$112,052,300.00. Your total investment in the fifth year is \$112,052,300.00. Have you, by any chance, divided your total tonnage into that figure, Mr. Ricketts?

A No, I have not.

Q And are able to give us the results of it?

A No, I have not done it.

Q I will give you the reason for asking that. Doing it with



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other submissions, it might indicate that you would come out with a higher figure than they would. Is there any explanation in particular about that, if that is so?

A Well, I have not examined any of the other exhibits, and, of course, do not know the basis for the design. I doubt if any two engineers would design exactly the same, but in one or two of the figures I have seen, I think our right-of-way costs are probably higher, our cost of steel is higher, and our installation cost is higher than that estimated in the one or two figures that I have seen, which would account for the higher figure.

Q Those are some of the illustrations that might account for it?

A Yes, that is right, which might account for a part of it.

Q Which might account for a part of it?

A Yes.

Q Anything else that you can think of?

A No, I cannot think of any other comments on it.

Q I take it that you have not had the opportunity, nor the time, of going into many of the other submissions, is that true?

A Yes, that is true.

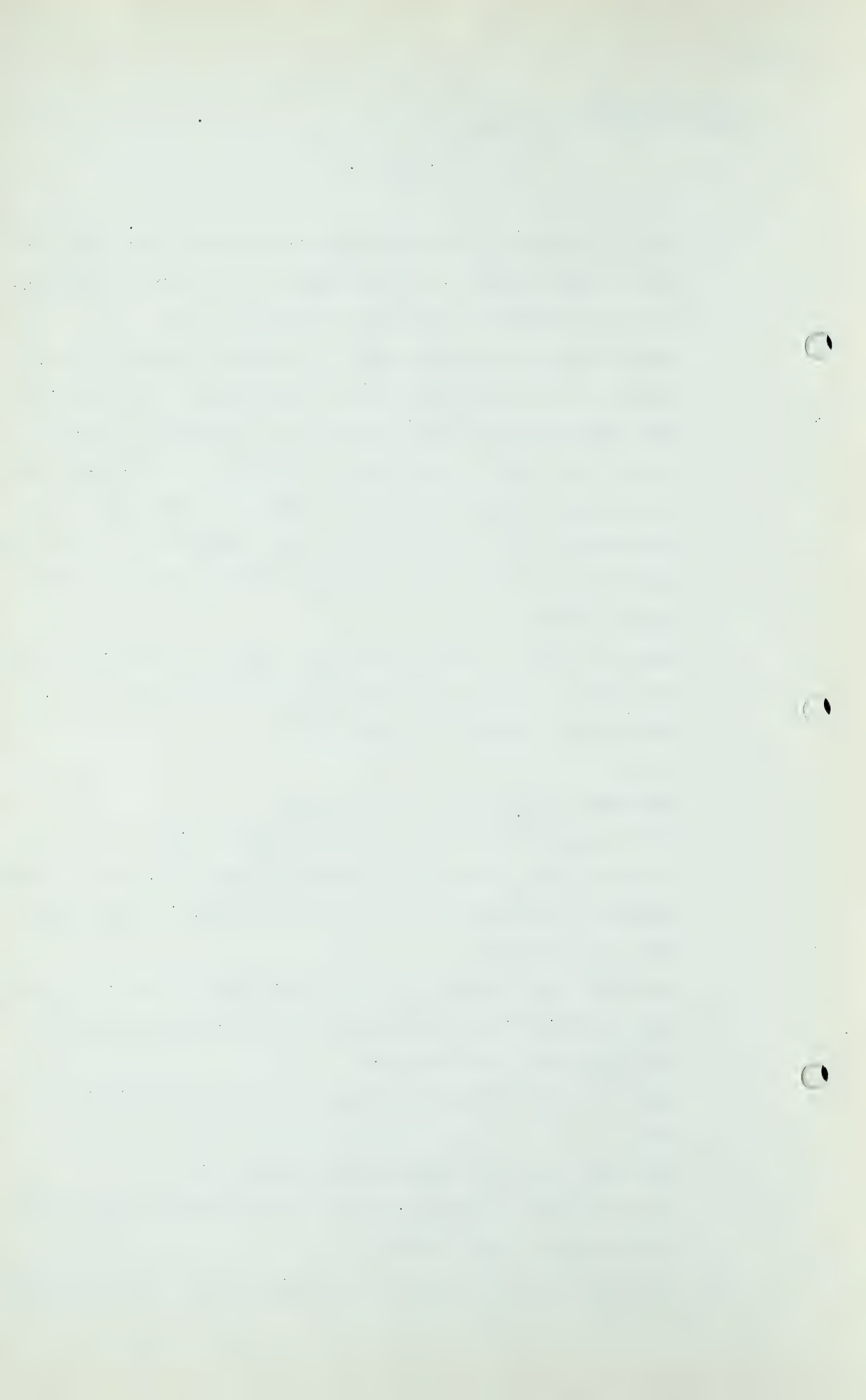
Q Oh, yes. With respect to this return that we have been talking about of \$7,283,400.00, what part, if any, goes to pay off bond interest, Mr. Ricketts?

A Well, your bond interest is paid out of the depreciation figure.

Q Can you refer me to what you are looking at?

A I am referring to page 12, and I think it is the same in all of the studies that we have.

Q You mean that the interest is included in the item of deprec-



R. D. Ricketts,
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iation of 3%?

A Could I check that answer before we get it down firm, please?

Q Oh, quite.

A Could I check it and have it a little later for you?

Q As a matter of fact we are near the adjournment time. Probably if we could adjourn now and finish afterwards. We sit again this afternoon, you know, Mr. Ricketts?

A Sure.

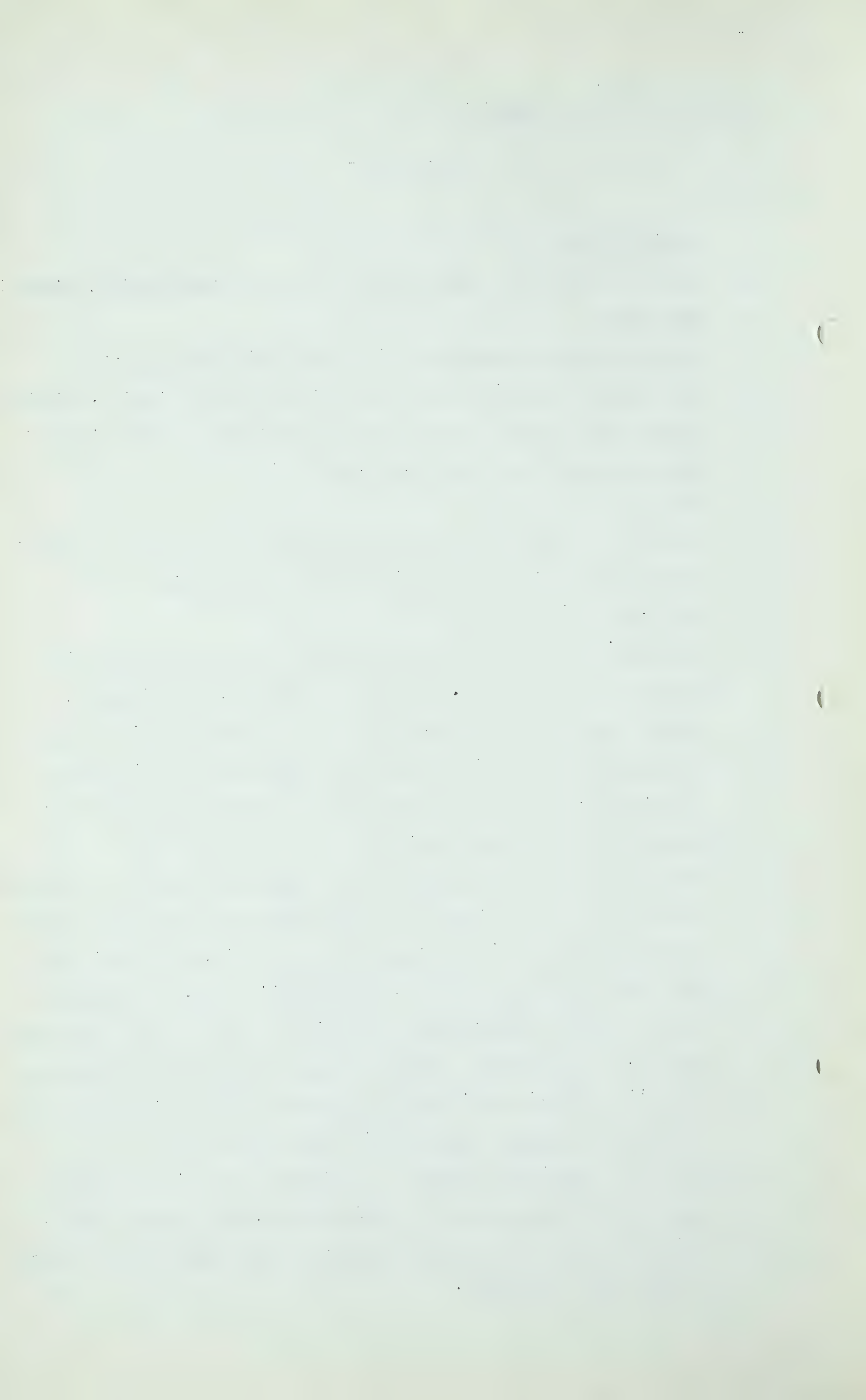
Q Probably I could go on for another couple of minutes. I think I will be through the exhibit filed by that time?

A Yes, all right.

Q Referring to exhibit 99, and your second page - oh, we have already corrected it. Referring to page 8, Mr. Ricketts, headed "Lateral Line Installation" and the last line, or the second-last line, "Miscellaneous", under the heading "Length of Miles", 30. Having regard to your map, I was wondering whether 30 is not very much too small?

A Well, that figure is meant to be an equivalent of 30. 30 would probably be much too small for the total miscellaneous lateral lines and sales lines that you would put in, but bearing in mind that very few of them, if any, will be 6-inch, and that there will be a great many that will be only 2, or 3, or 4-inch lines, so that we have estimated that the equivalent length of 30 miles of 6-inch will be satisfactory to meet the needs. That is, for the various lateral line connections.

Q All I was saying as a layman, looking at the line from Guelph over to Kitchener and over to Stratford, which are not mentioned in your total, and I thought I could figure a lot more mileage than you have.



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A I am sure you can, but a lot of those would be less than 6-inch.

Q You took the size plus the 30 miles, and you believe that would be sufficient to cover it?

A Yes, we believe that would be a reasonable and an adequate estimate.

MR. C. E. SMITH: Well, I think, probably, sir, this is a convenient time to adjourn - I think it is, It is almost 12.30.

THE CHAIRMAN: All right, we will adjourn until 2 o'clock.

(Hearing adjourned and resumed at 2 P.M.)

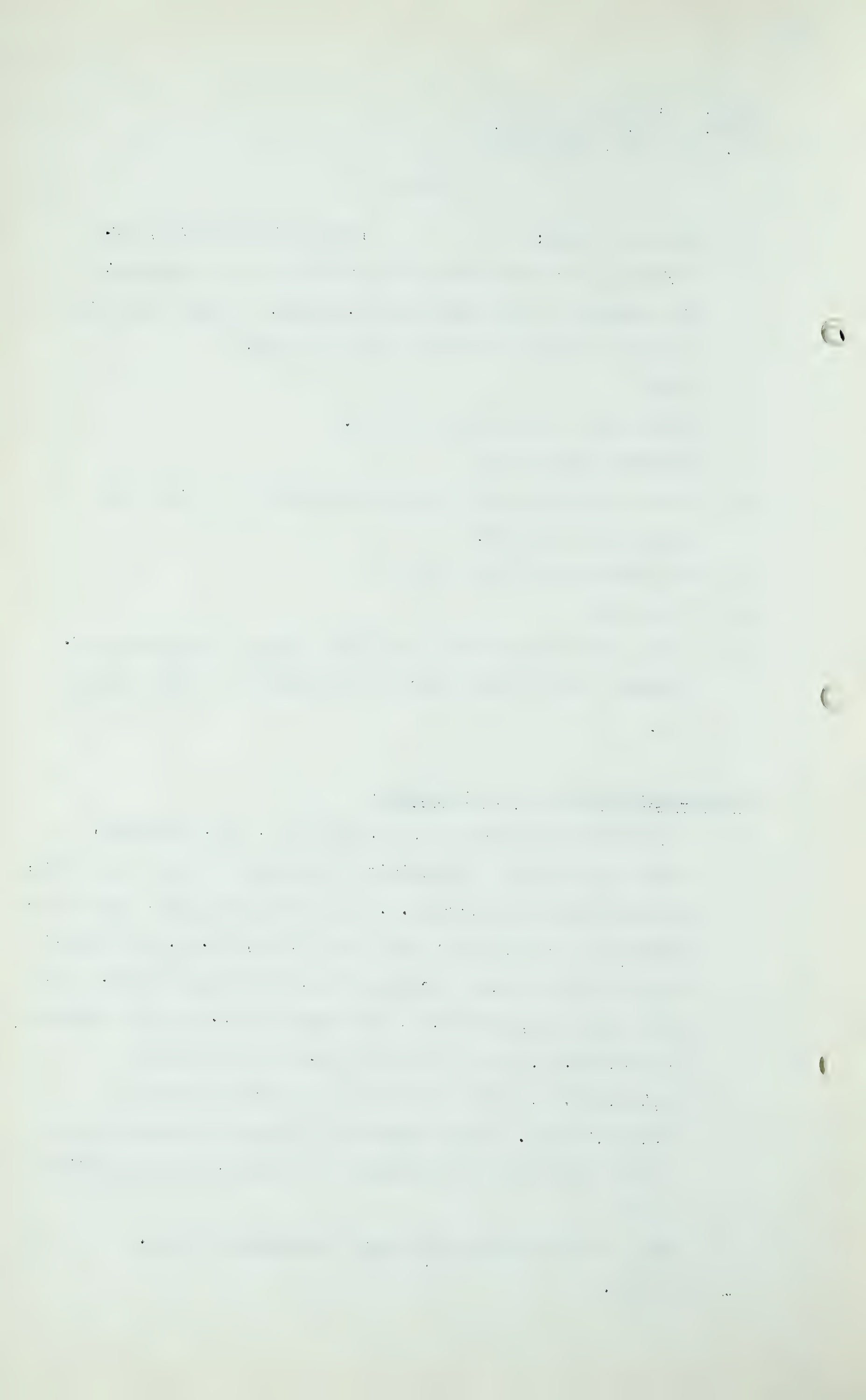
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- Q MR. C.E. SMITH: During the interval, Mr. Ricketts, did you find out the answer to the question?
- A The answer to your question, Mr. Smith, is that the bond interest comes out of the rate of return.
- Q What?
- A Comes out of the rate of return.
- Q And what percentage?
- A This is set up on a financial structure of 75 per cent bonds at 4 per cent.
- Q 75 per cent and 4 per cent?
- A Yes, sir.
- Q I may have had something else but I have been reading Mr. Brownie's submission during the interval so I will leave you.

CROSS-EXAMINATION BY MR. McDONALD:

- Q I just have one question, Mr. Ricketts. Mr. Ricketts, if you turn to page 7 of Exhibit 98 and turn to the first item, Pincher Creek to Canada-U.S. border 24-inch pipe, 260 miles, your total installation cost is \$12,355,200.00, and during the noon hour I made a calculation, 100 miles at \$12.00 per foot equals \$6,336,000.00, 100 miles at \$9.00 a foot equals \$4,752,000.00, and 60 miles at \$4.00 a foot equals \$1,267,200.00, which works out to an exact total of \$12,355,200.00. I was wondering if that represented some of the detail of your estimates or a reasonable breakdown of it?
- A That is approximately the same breakdown we used.
- Q Thanks.



R. D. Ricketts,
Exam. by Dr. Govier.

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EXAMINATION BY DR. GOVIER:

Q Mr. Ricketts, I wonder if you could tell me a little bit about the compressor ratio picture on the line? I notice you give the figures in Exhibit 98 on the first map for the compressors that are to be installed in the first year. Could you give us the corresponding figures for the compressors after the new ones are installed and these particular ones are operating under different conditions?

A I do not have that detail with me. I consider the average ratio of operation when all compressor stations are installed at the end of the fifth year would be approximately 1.4.

Q That is fine, then, that gives me all I need to know. And in Exhibit 99, do you have the corresponding detail for the compressor station installations that are presented in Exhibit 98?

A I believe I have. The station at Windsor, the horsepower that we anticipate installing there is 5,280, an intake pressure of 500 p.s.i.g., and discharge pressure of -- this has gotten a little stale, but I think it is 765 p.s.i.g., and a ratio of 1.415. You can calculate it very easily. The next station is 4,188 horsepower, intake and discharge pressure of 565 to 780 p.s.i.g., a ratio of 1.37. The third station is 2,640 horsepower, intake and discharge pressure of 630 and 780 p.s.i.g. respectively, with a ratio of 1.22.

Q Do you have the required horsepower figures in addition to those installed figures?

A I do not have those handily available. They are approx-

R. D. Ricketts,
Exam. by Dr. Govier.

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imately the same and there is no deration required for elevation in this area.

Q Mr. Ricketts, what factors would you take into account in determining how much compressor horsepower to install over and above that which your calculations would tell you was required, thinking now of Exhibit 98 in particular?

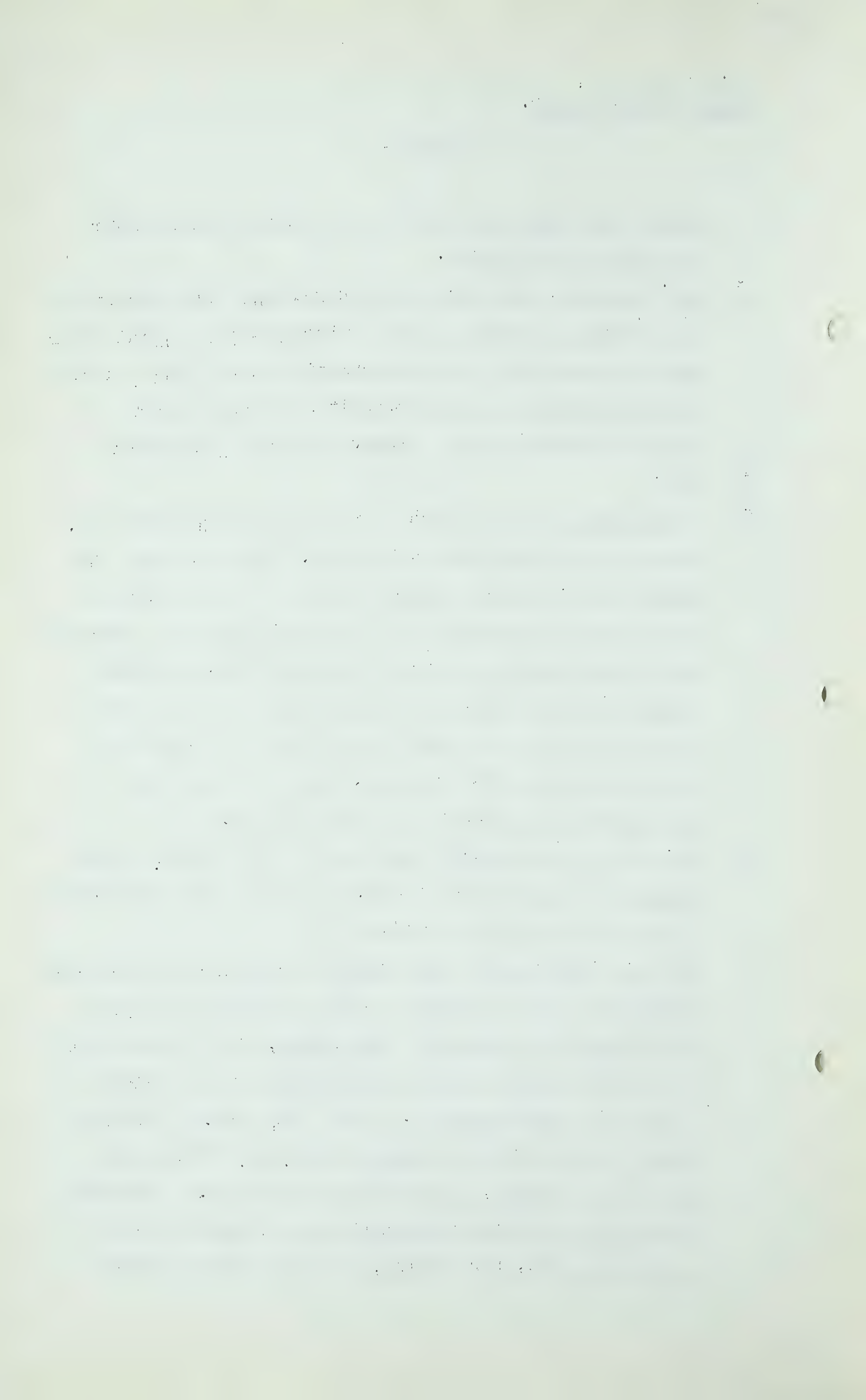
A You are referring now to reserve or spare horsepower?

Q Yes.

A In designing a system such as contemplated in Exhibit 98, we take into consideration the load, length of line, the type of load, namely, whether or not it is interruptible industrial or whether it is all domestic load or commercial load, and in general we try to design with the minimum number of units having the largest amount of horsepower backed into them that will give us not less than one or two per cent over that required, one or two per cent of the horsepower installed over that required.

Q Now, you say in general that would be your policy. With respect to this particular line, you have gone considerably above the one or two per cent?

A We have, and that has been because of dividing the required horsepower into the number of units necessary to supply that amount of horsepower. For example, the standard unit available from the current manufacturers of gas engine compressor units range 1100, 1320, 1760, 1960, I believe there are some made at slightly over 2,000, 2500, and there are standard 3,000 horsepower units made. We chose 1320 horsepower units and when they are derated the required horsepower, for example, at the station located



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just below Trail, is 4,339. We are installing four units making the installed horsepower 5280. We have a flexibility of four, which means that if we lose an engine at that station by slightly increasing the speed and calling on some excess overhead for a short period of time we would lose very little, if any, capacity in the pipeline by the loss of one individual unit.

Q You would not attempt to install enough capacity so that an entire station could go down and you could still maintain the entire load?

A No, we would not. It is not common practice. It is so unusual for that to happen it is not common practice, that I am familiar with, at any rate, in designing transmission lines.

Q The figure of 5280 installed horsepower, that is the rating of the amount of horsepower to be installed at sea level and its actual performance under those conditions would be less?

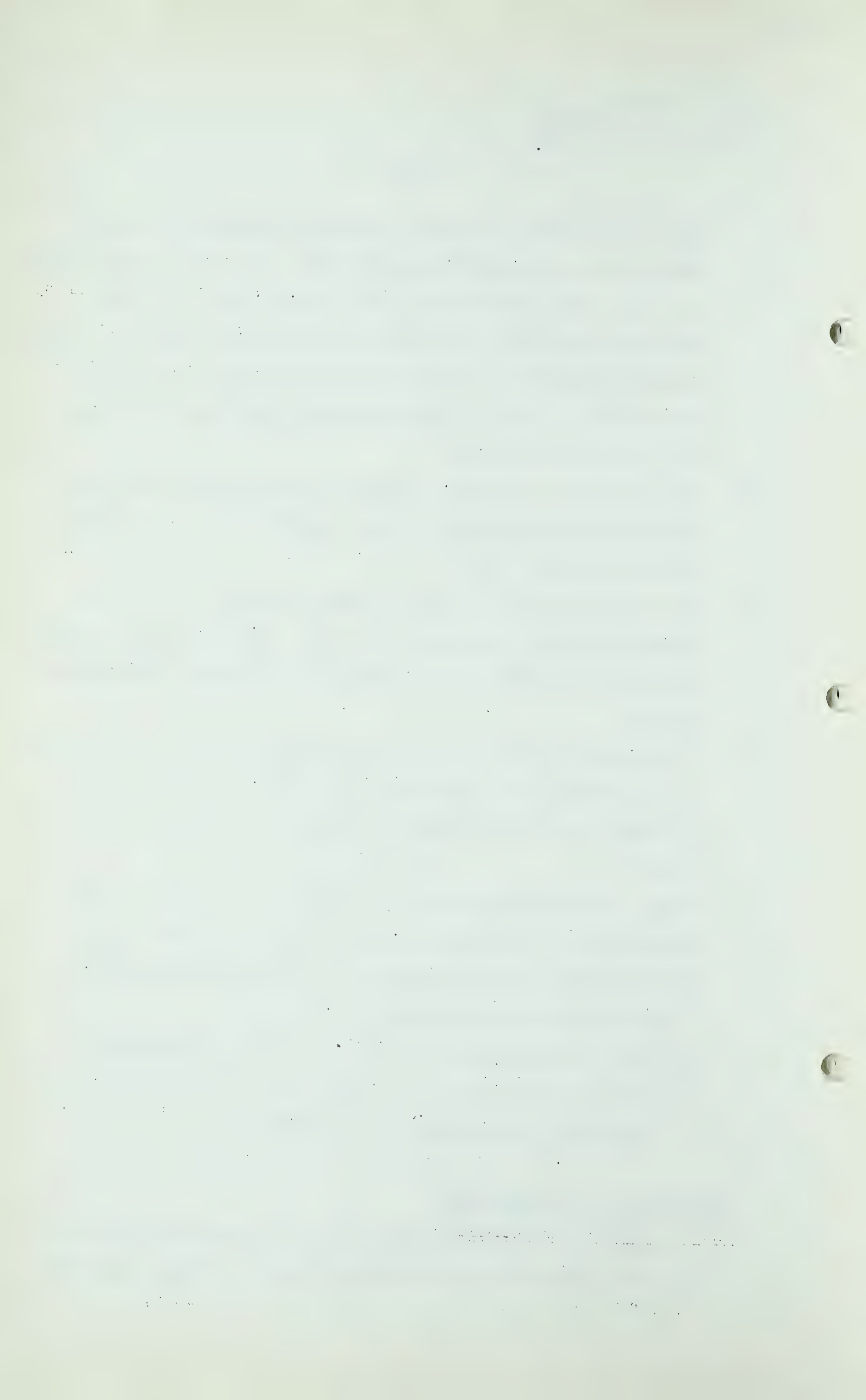
A Would be $12\frac{1}{2}$ per cent less. We have estimated as nearly as possible from maps that the elevation at that point, which is the station below Trail, is approximately 2500 feet and we derate $12\frac{1}{2}$ per cent.

Q So that although 5280 is 35 per cent higher than 3905, it does not mean 35 per cent over capacity at that point?

A It does not, your assumption is correct.

EXAMINATION BY THE CHAIRMAN:

Q I wonder if you would mind turning to page 12 of Exhibit 98, "The Economic Costs Study in the Fifth Year", page 12?



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A Yes, sir.

Q I believe in answer to Mr. Smith, I think it was, you said that no depreciation had been taken off the total investment of 112 million odd thousand?

A That is correct.

Q Normally, in your rate of return, wouldn't you have depreciated your rate base?

A I might explain that a little further. I think the answer to your question is "yes". The reason it is not taken here is because our client advised us that they had no way of telling that the additional facilities would not be required the first year. We did not know what year those actually would come in, therefore we carried the full investment of the first year over, which results in a maximum cost of service. Now, if we would depreciate the \$84,000,000.00 investment figure by five years that would have a beneficial or lowering effect on the cost of service and would result in a lower cost of gas to the ultimate customer.

Q Assuming that the rate of return remains the same?

A Yes, assuming the percentage rate of return of $6\frac{1}{2}$ per cent remains the same.

Q Is there any provision in this for bond retirement at all?

A Yes, sir, there is provision for bond retirement and bond interest.

Q What is the amount of bond interest out of the 7 million?

A This is building up on a 75 per cent bond indebtedness, and a 10 per cent preferred stock and 15 per cent common stock is the schedule of financing. Now, we have a $6\frac{1}{2}$ per cent rate of return on the Eastern Canada figures, for example.

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I happen to have them in front of me and the depreciation is 3 per cent so that cash available, add the two figures together, and from that you deduct the bond interest and the bond payment, which is a 20-year payment, the bonds are set up to pay out in 20 years.

Q What amount of bond interest have you included in this figure of \$7,283,000.00?

A In the \$7,000,000.00 figure?

Q Yes?

A Well, I don't have that detail in front of me. I would be glad to work that up for you.

Q Would it be on the whole bond issue without any return?

A I do not hear you.

Q Would it be the interest on the whole bond issue on the basis of \$112,000,000.00?

A It would be the interest on the whole bond issue.

Q In other words, you have not allowed anything for retiring bonds in this fifth year at all?

A No. This is built up as if this were the cost of the system at that year.

Q If that was the initial year. You said before the reason you had not taken any depreciation off or you don't know when this fifth year might be put into effect, the scheme might be fully constructed in the second year?

A That is correct, yes.

Q Was the bond interest figured on the same basis?

A Yes, sir.

Q So there was no allowance made for bond retirement in the interest figure you have allowed in the \$7,000,000.00?

1. The first part of the report

2. The second part of the report

3. The third part of the report

4. The fourth part of the report

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A That is correct. Sorry I misunderstood you, I did not hear very well.

Q Then Exhibit 99, on the second page, "Detailed Estimate of Operating Service Cost". Is that based on the first year of operation, that is, the line would be fully constructed in the first year?

A This is based on the first full year of operation, yes, sir.

Q Well, would the line be fully completed then?

A On Exhibit 99 the line is complete. That is the only study we have made on it.

Q For the complete installation?

A That is correct. Now, that does not preclude the possibility of looping or adding to that line, it just means we have not considered it in this study, our client did not ask us to go into that.

Q To come back to this matter of the Canadian duty which was discussed earlier, I wonder if you would mind referring to page 5 in Exhibit 98, and the first page of Exhibit 99. I believe that you explained that in the figure of \$798,800.00 that that did not include sales tax, or am I correct in that?

A No, we estimate that includes the sales tax and duty.

Q Sales tax and duty?

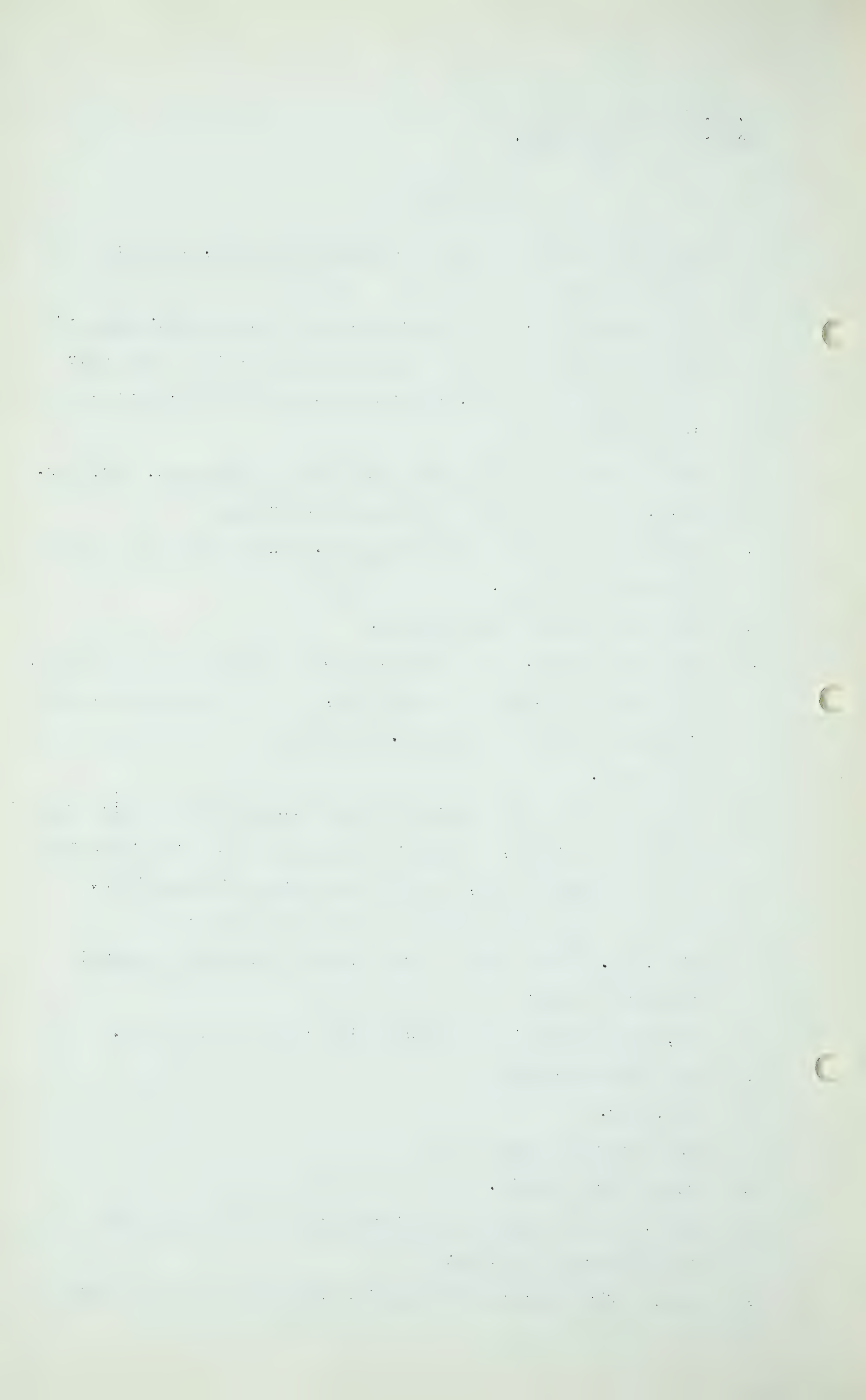
A Yes, sir.

Q On an agreed basis?

A On an agreed basis.

Q Well, why were the two different rates used then in the two different exhibits?

A In the first exhibit we made the assumption that we would



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be able to negotiate between the Canadian Government and the pipeline company, not that we would negotiate but the pipeline company, our client, would negotiate for the duty and the sales tax. That was the best estimate of what that would be. In Exhibit 99 we chose to present to the Board here the maximum that might be expected as a cost of service. These represent the best figure that we were able to get which would represent a maximum sales tax and duty for the Eastern Canadian project. Now, that may be wrong but that was the way we chose to do it. It can be changed to any other basis.

Q Don't you think out in the West here they might be able to get a better break than they can down East?

A Well, that may be.

Q Would you agree with Mr. Martland's figure this morning of \$1,355,000.00 as a fair estimate with regard to Exhibit 98?

A No, I would not agree that that was a figure --

Q What would your maximum estimate be suppose you are not able to reach this agreement?

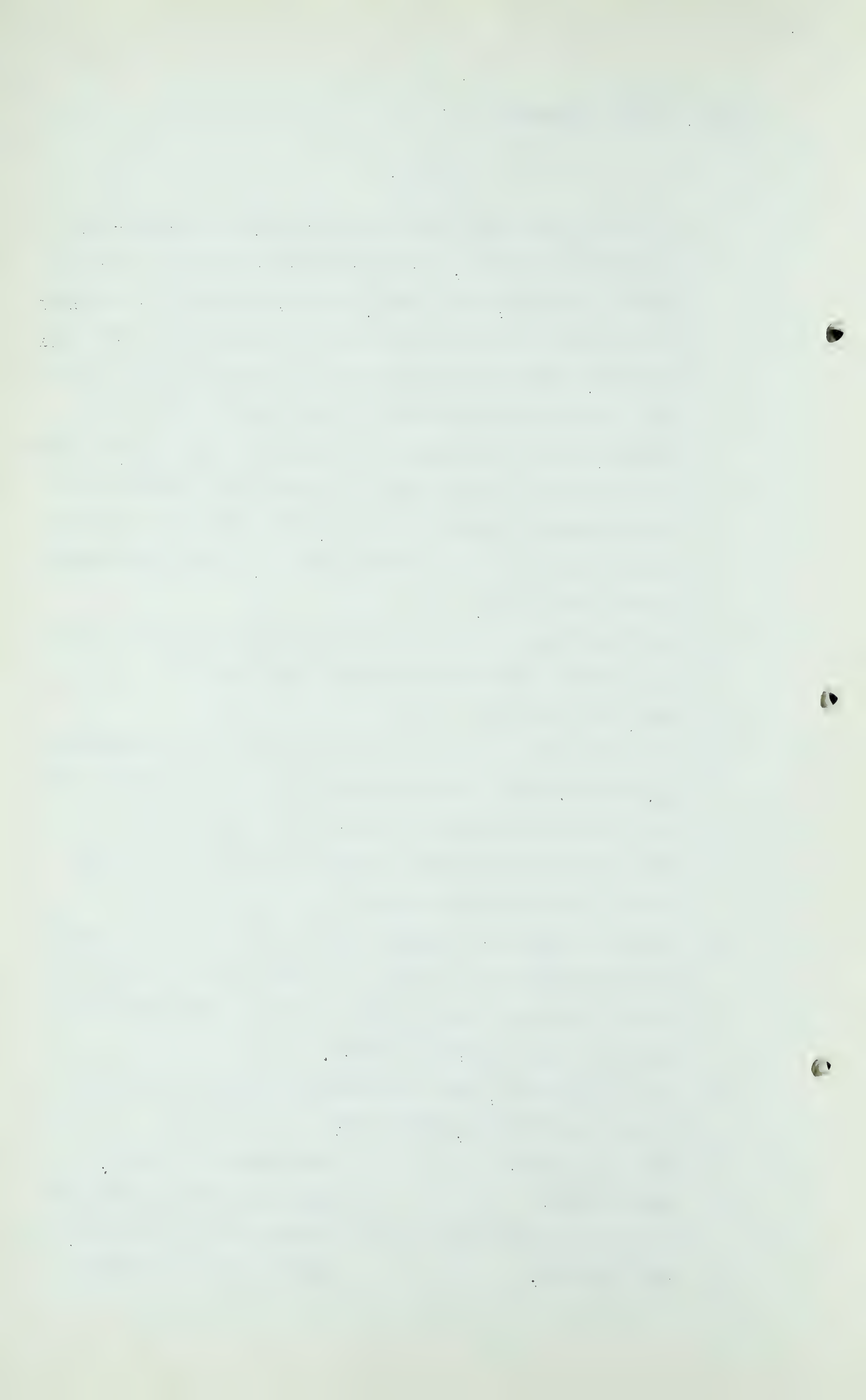
A I have not made any maximum figure but I would say that if the percentages were taken in the same ratio as they are taken in Exhibit 98 you would arrive at a maximum figure that we might reasonably expect.

Q Well, Exhibit 99, what percentage increase did you use there to get the \$3,000,000.00?

MR. S.B. SMITH: They appear at page 1.

A THE WITNESS: They are shown in Item 1-A on page 1 of Exhibit 99 in the lower third of the page.

Q THE CHAIRMAN: That is even at a higher



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rate than Mr. Martland suggests?

A I believe it would result in a higher rate, yes, sir.

Q But your idea of your maximum is to use the same percentages on the total of your cost of pipe and the compressor?

A That is right.

Q I think that is all, thanks.

MR. S.B. SMITH: I am sorry to say we have no other witnesses today. Our remaining witnesses we expect will be available on Monday morning. It is rather difficult to forecast how long each witness is going to take and I would have several witnesses here for some days. While I expect to be ready for Monday morning, if the remaining time this afternoon can be used I would therefore appreciate the postponement of the completion of our case until 9:30 Monday morning.

MR. C.E. SMITH: Mr. Brownie is here, I think, sir.

THE CHAIRMAN: I was going to make an announcement about Monday morning. The Shell Company has asked that they be allowed to present a submission in connection with the Jumping Pound field which would incorporate the latest data they have in regard to the field, and we would wish to arrange to have that put in Monday morning. I do not think it should take very long.

MR. S.B. SMITH: Well, I have no objections at all, sir, except that I would, if possible, like to let the men we bring here Monday away. They are busy men and perhaps we could sit a little longer or it may be that the Commission may be sitting afternoons, in any event.

Discussion.

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THE CHAIRMAN: Do you think it will take very long to hear the rest of your witnesses?

MR. S.B. SMITH: I do not anticipate so, sir.

THE CHAIRMAN: Also, the Board intend to have Mr. Crockford, the Board's geologist, give his views on the following fields: Morinville, Legal, Picardville and Cessford. Copies of his submission will be available on Monday and we will hear him later on in the week. Mr. Steer, could we have Mr. Brownie come forward?

MR. STEER: The submission which Mr. Brownie is presenting, Mr. Chairman, is one that does not lend itself to being dealt with summarily nor does it lend itself to question and answer and it seems to us that probably it is a choice between having Mr. Brownie read it or relying on those who are interested having read it and simply having Mr. Brownie answer questions about it. Either course is agreeable to us.

THE CHAIRMAN: Would you prefer to have it in the record, Mr. Steer?

MR. STEER: Well, it could be copied into the record without actually being read. It should be in the record. Could we have the document marked, sir? My suggestion is, I have no doubt everybody has read this, and it would save a great deal of time if Mr. Brownie was to be cross-examined by those who wish to cross-examine him.

THE CHAIRMAN: That would be satisfactory to the Board.

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Direct Evidence.

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SUBMISSION OF CANADIAN
WESTERN NATURAL GAS COMPANY
LIMITED AND NORTHWESTERN
UTILITIES LIMITED PUT IN
AND MARKED EXHIBIT No. 100.

F. A. BROWNIE, (recalled)

already sworn, testified as follows:

CANADIAN WESTERN NATURAL GAS COMPANY LIMITED

and

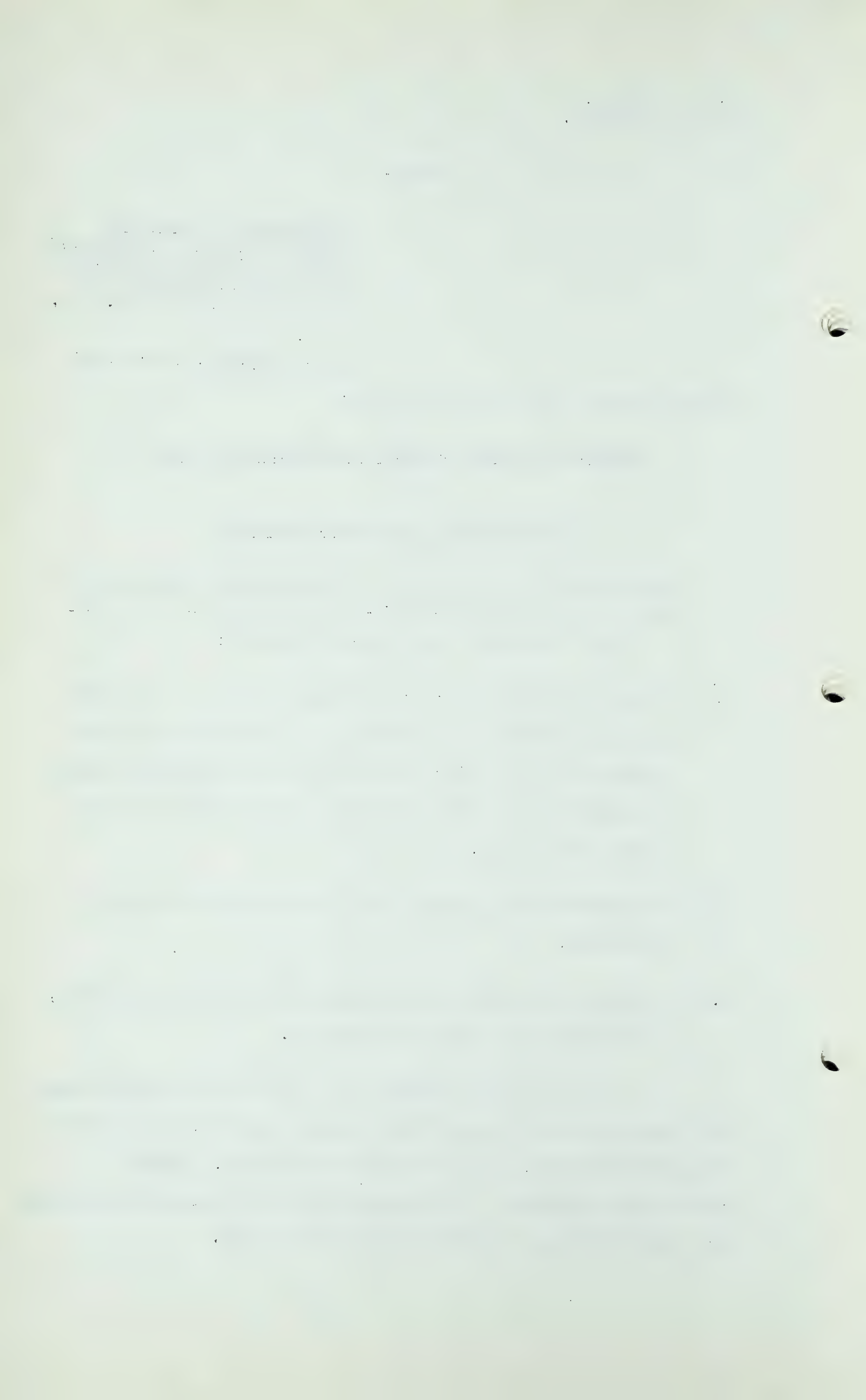
NORTHWESTERN UTILITIES, LIMITED

Submission to the Petroleum and Natural Gas Conservation
Board.

This submission has several purposes:

1. To outline for the record the recent history of natural gas in Alberta by reference to the activities of the Province's two major gas utilities in discharging their obligations to their consumers in the matter of long range gas supply.
2. To summarize the present field price situation in the Province.
3. To discuss generally the problems inherent in gas export, and certain resulting conclusions.

The two largest natural gas utilities in the Province are Canadian Western Natural Gas Company Limited, here called "Canadian Western", and Northwestern Utilities, Limited, called "Northwestern". The former serves the Calgary-Lethbridge area and the latter the Edmonton-Red Deer area.



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Canadian Western

The growth of Canadian Western's market from the year 1930 is portrayed graphically on Figure I herewith. This will be used as a basis for a discussion of the activities of the Company during the period in trying to establish adequate long range gas reserves. The period prior to 1930 has been omitted since conditions during that time in almost all respects were so different from conditions since that it is now of little interest. It will be noted that the Company's sales over the period 1930 to 1939 varied very little one side or the other of 8 billion cubic feet per annum. With the beginning of the war rapid increases were experienced until the sales amounted in 1945 to about 18 billion cubic feet. There was a one-year recession in 1946 following the war, but in 1947 another period of rapid growth began, resulting in annual sales in 1950 of some 24 billion cubic feet, and sales which in 1951 will probably amount to 26 billion cubic feet. This means that since 1939 there has been a three-fold increase in requirements, a fact which points up the difficulties faced by the Company in keeping its reserves in step with requirements.

By the year 1930 a general pattern had been established under which Turner Valley became the chief source of supply for the Company, with the old Bow Island and Foremost fields kept in reserve for peak load and emergency purposes only. Had Turner Valley been operated during the early years with any effort towards reasonable conservation, the long range requirements of the Company would have been assured from that source. However, as is well known, during the early 1930's enormous

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quantities of gas in Turner Valley were wasted. So much was this so that instead of constituting a suitable long range reserve the useful life of the field had to be considered as very limited. This situation dictated the necessity of some efforts toward the finding of an alternative source of supply. This was to a greater extent true at that time than it would be today because of the wide disparity in the amount of exploration by other companies in the southern part of the Province as between the 1930's and more recent years.

The Company was active therefore throughout the period 1930 to 1939 in trying to find additional sources of supply. Exploration and drilling techniques were not as far advanced during the 1930's as they are today. Moreover, what would be regarded at the present time as a very modest annual program was in those days a substantial one. This was particularly true in that the Company's total annual revenues over the 1930's averaged about \$2,100,000, and a program reasonably tailored to the Company's resources was of necessity modest. The following is a brief outline of the activities of the Company's geological and exploration department in each of the years 1930 to 1939.

1930 Three diamond drill holes were drilled in the Bow Island-Foremost area, and geological surveys were carried out in the Milk River and Red Coulee areas. Enough work had been done at this time to indicate fairly clearly that if explorations were to be carried out in the general Bow Island-Foremost area they must be by the drilling of wells since surface work was considered to give no reliable indication of subsurface

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conditions. The Company, of course, did not have the resources to carry out extensive drilling programs. Moreover the area between Foremost and the International Boundary was well over 200 pipeline miles from the City of Calgary, the Company's main market, and gas from that source would therefore be expensive in terms of transmission cost.

1931 Geological and magnetometer surveys were carried out from High River south to Macleod and extending westward into the outer foothills. The 1930 diamond drilling program was completed in the Burdett area.

1932 A great deal of effort on the part of the Company's staff was devoted to a study of gas reserves in Turner Valley. In that year the Conservation Board formed by the Provincial Government was gathering the first accurate information on wells in the Turner Valley field. Magnetometer work was continued in southeastern Alberta, and the Company carried out certain research work in an attempt to evaluate the usefulness of the magnetometer surveys.

1933 Turner Valley studies and Burdett explorations were continued.

1934 In cooperation with two other companies extensive seismic surveys were carried out in the High-River-Aldersyde area which work in earlier years had indicated to be an interesting prospect.

1935 A geological and magnetic survey was made from Jumping Pound north to Fallen Timber Creek covering the outer

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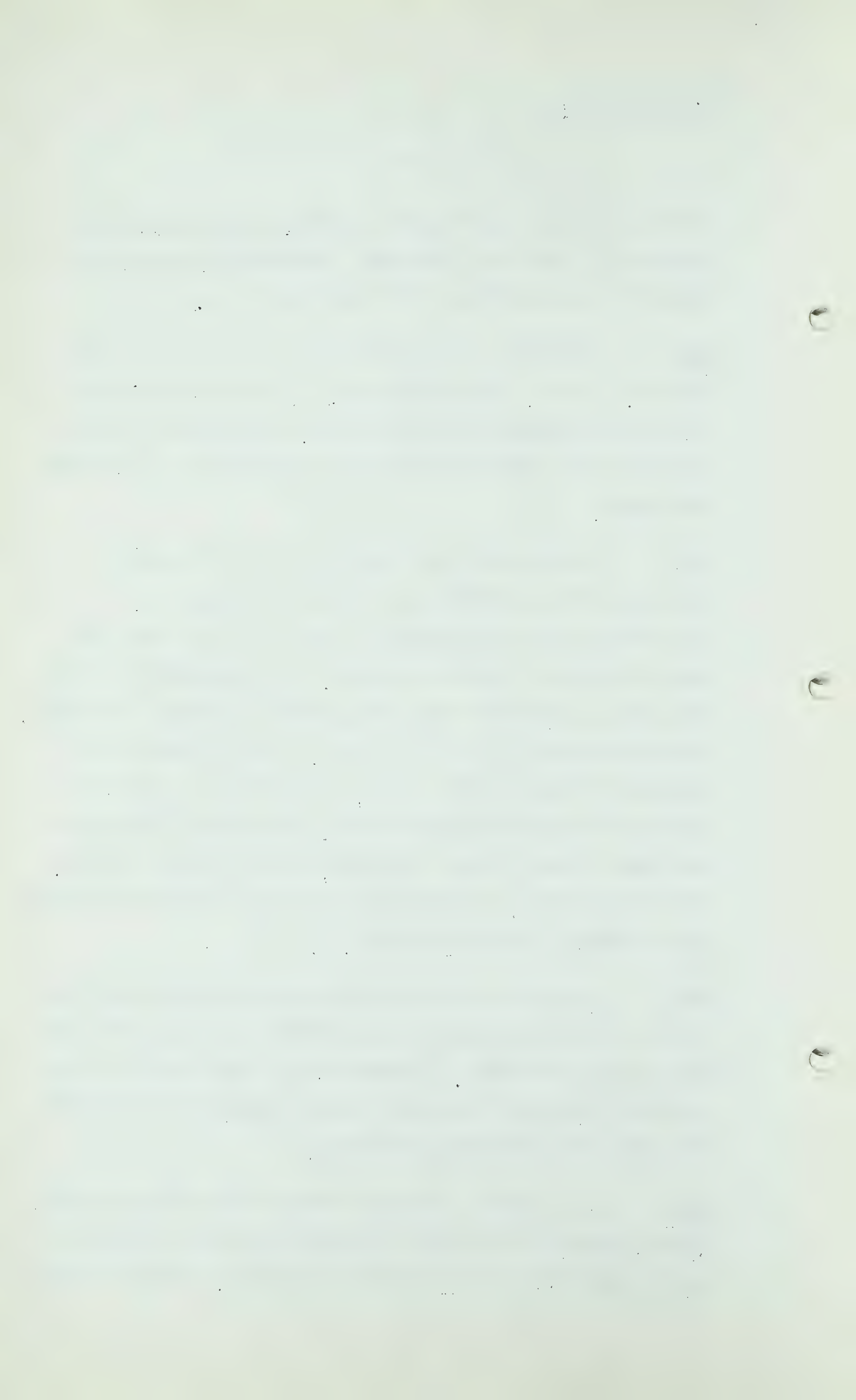
foothills and the western part of the Alberta geosyncline northwest of the City of Calgary. Additional monies were expended on exploration of the High River area.

1936 Geophysical work was carried out in the vicinity of Oyen. A well, known as Arca No. 1, was started on the anticlinal structure near High River. A geological survey was made of the Red Deer River from the foothills to a point near Nevis.

1937 The Arca well was completed in the palaeozoic limestone without discovering commercial production. A geological survey was made of the outer foothills from Red Deer northwards to Marble Mountain. An anticlinal structure was found on Bearberry Creek and another near Marble Mountain. Leases were taken out in both areas. A magnetometer survey was made of the Bearberry area, and an aerial photographic survey of the Marble Mountain area. Geological surveys were also made on Nose Creek, Twin Dome, Willow and Rice Creeks, and Pekisko Hills. Contributions were made towards the deepening of Barnwell (Chin Coulee) No. 6.

1938 A well was drilled on the Bearberry anticline but a large overthrust fault was encountered at about 4,000 feet, and the well abandoned. Diamond drilling was carried out on the Marble Mountain anticline, but no commercial production was found in the Devonian limestone.

1939 A geological survey was made of the limestone anticline between Prairie Creek and Ram River, and a geological survey made of the Moose Mountain structure. The well on the



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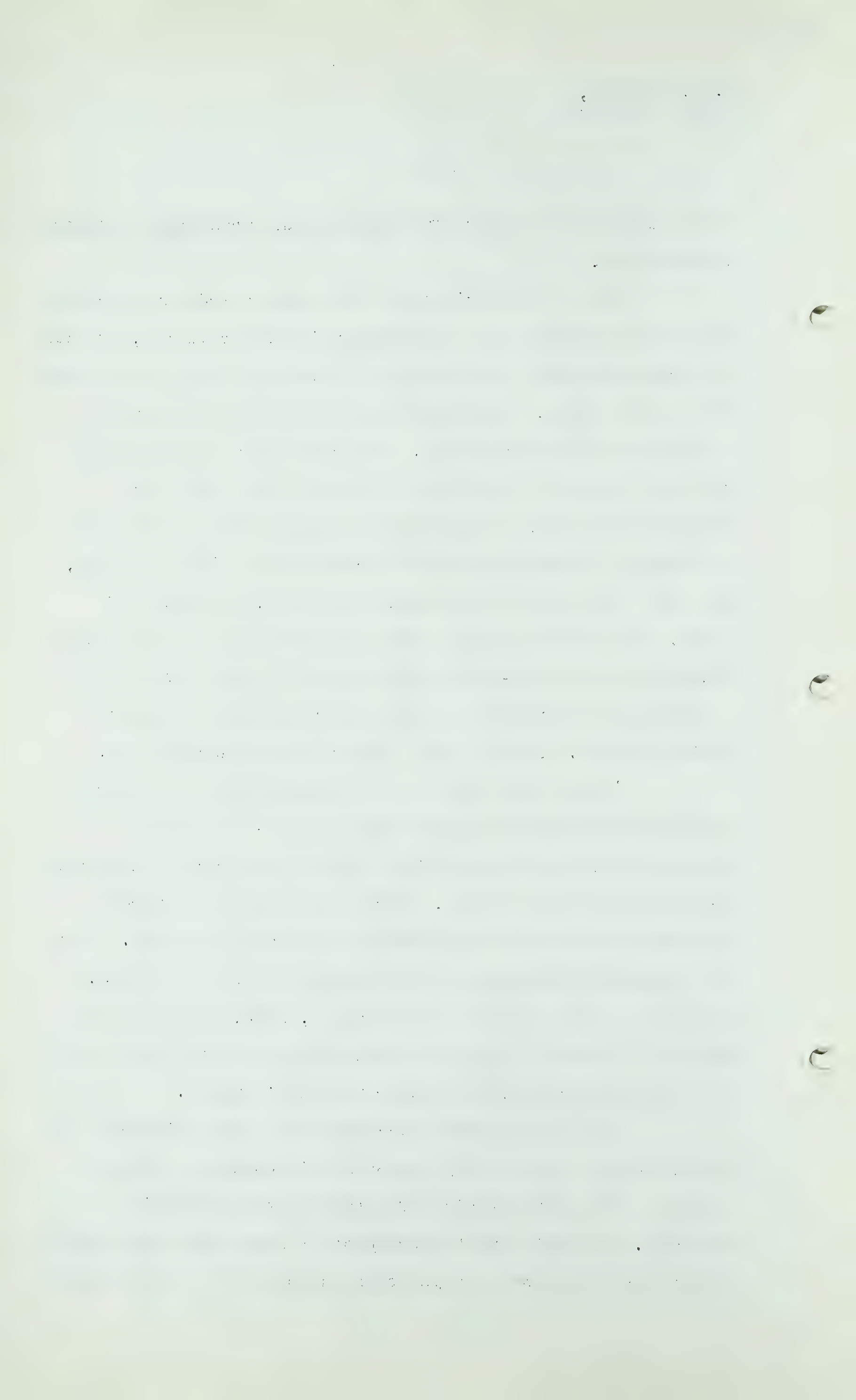
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Marble Mountain structure was deepened and abandoned as being unproductive.

Due to the beginning of the war in 1939 and increasing efforts towards gas conservation in Turner Valley, as will be discussed later, the Company's activities were discontinued for several years. However, they have been more recently resumed on a different basis. In 1948 a cash contribution was made towards the drilling of a deep test near Black Diamond by the Anglo Canadian Oil Company Limited. In 1949 the Company contributed half the cost of drilling two wells, one near Juno and the other near Fincastle, both east of Taber. In 1950 the Company bore half the cost of a test near Drumheller on a four-mile square farmout to the Devonian with an option on a number of surrounding townships through the Viking horizon. All of these ventures were unproductive.

In the year 1944 the Natural Gas Utilities Board commenced hearings for a two-fold purpose -- to effect conservation, and to share the available gas market among all producers in Turner Valley. During that hearing numerous estimates were made of the field's marketable reserves. They were taken by the Board in its decision of 1947 to be 342.5 billions of cubic feet as at January 1, 1945, which on the basis of a somewhat curtailed market following the war would have been the equivalent of over 20 years' supply.

In 1944 the first successful well was drilled on the Jumping Pound structure by the Shell Oil Company of Canada Limited. This gave promise of establishing substantial reserves. At that time the prospect of large-scale gas export from the Province was not yet being discussed. It was reason-



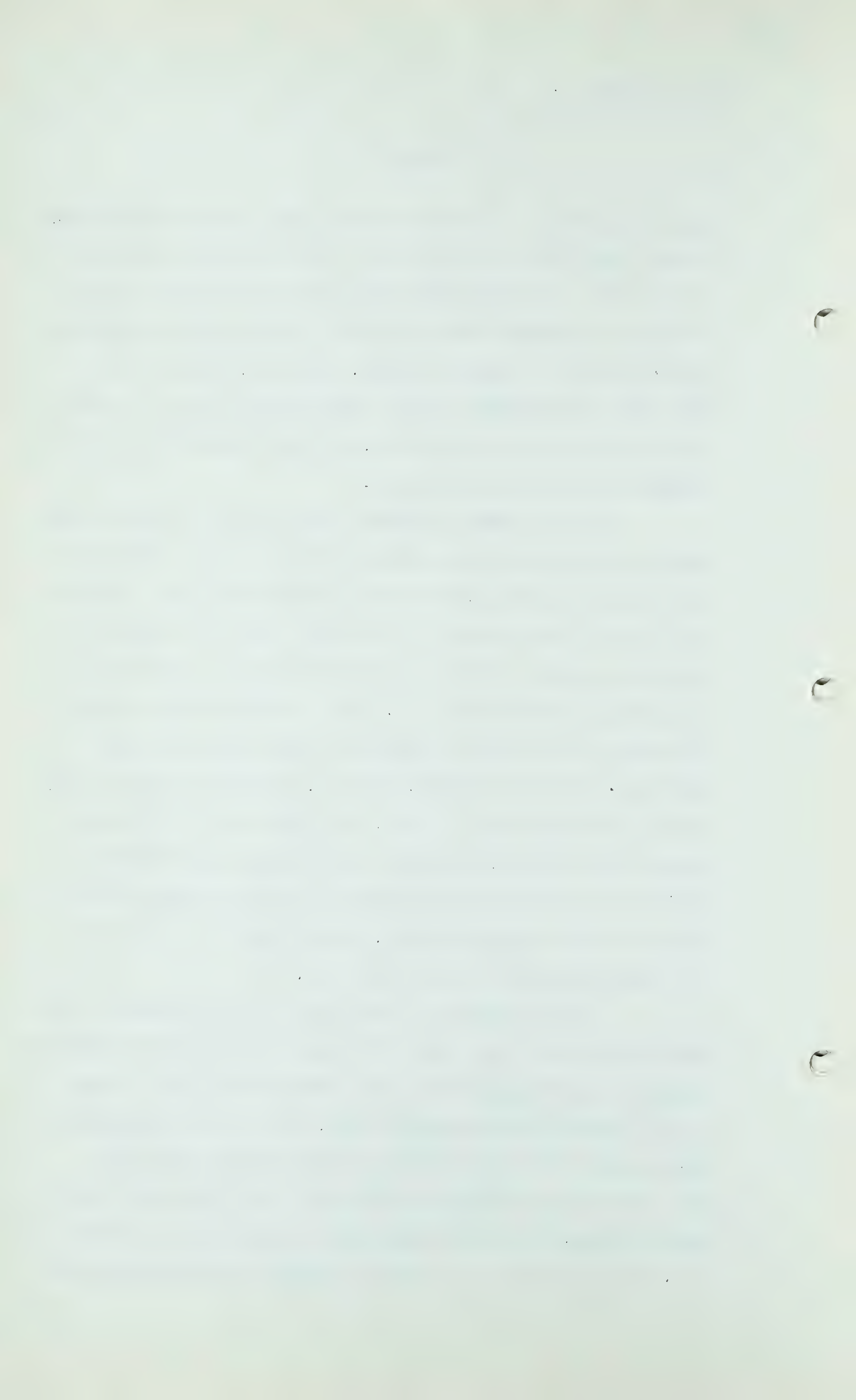
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able, therefore, to assume that with the further development of the Jumping Pound field a gas supply from that source would be available to Canadian Western. Discussions along these lines were commenced with the Shell Oil Company as early as 1947. It must be borne in mind, moreover, that at about that time the Company's market had reached a peak of about 18 billion cubic feet per year, and the substantial post-war expansion was not yet apparent.

As it became evidence that a period of increasing markets was in prospect, and as further drilling tended to prove up the Jumping Pound field, discussions with the Shell Oil Company were pressed in a sincere effort to work out a suitable contract for the purchase of gas in that field. Undoubtedly the completion of such a contract was delayed following the initial proposals to export gas from the Province. The discussions, however, finally resulted in the signing of a contract in 1950, the construction of the necessary facilities by the Shell Oil Company and Canadian Western, and the first delivery of gas from Jumping Pound to Calgary in the spring of 1951, and to Exshaw and Banff in the summer and fall of the same year.

In the summer of 1951 a gas strike was made at the Bailey-Olds No. 1 well east of Didsbury. The Canadian Western Company is presently negotiating franchises in all communities between Calgary and Red Deer, and has had preliminary discussions with the operators of the Bailey-Olds well in the direction of taking gas from that area for these towns and villages, and if the technical problems can be worked out, ultimately for the present Canadian Western system and



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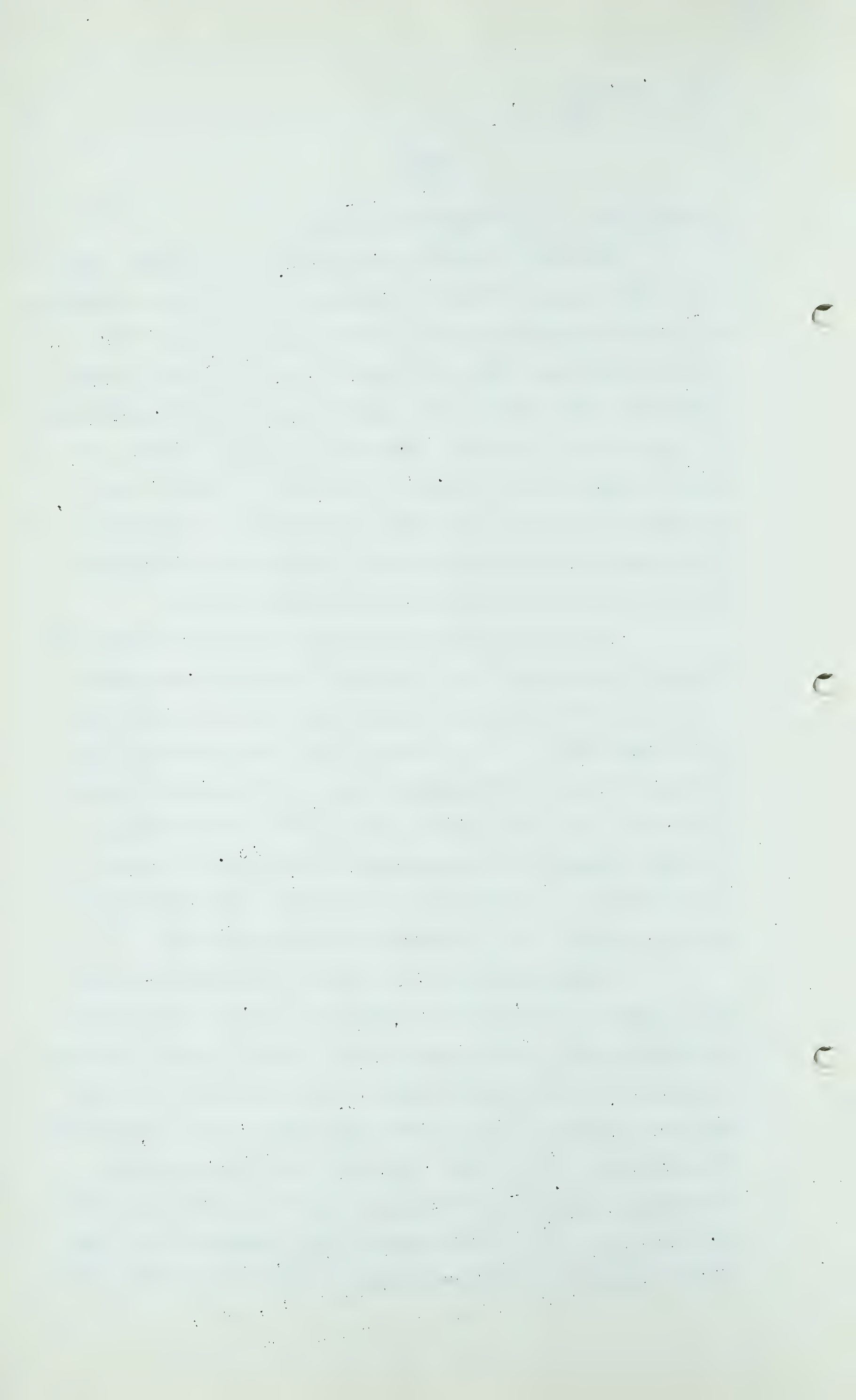
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possibly for the Northwestern system.

It would be difficult to know at the present time what useful purpose could be served by the Company's embarking on a generalized exploration and drilling program. If it were properly done the cost would be very substantial since drilling in the Calgary area, particularly in the foothills, is tremendously expensive. Moreover, it appears that companies searching for oil will in the next few years carry out extensive work in this area, and if gas is discovered there seems to be no reason why it should not be available on reasonable terms to the Canadian Western market.

Canadian Western's contract with Royalite from the beginning was an exclusive one which placed serious barriers in the way of the Company in taking gas from a source other than Turner Valley. This contract was abrogated as to its exclusive feature by The Natural Gas Utilities Act. On the other hand, the fact that the Natural Gas Utilities Board ordered substantial expenditures in Turner Valley for the conservation of natural gas reinforced the idea that Turner Valley had first call on Canadian Western's market.

Canadian Western, of course, had no control over the situation in Turner Valley when such large volumes of natural gas were being wasted in the 1930's. It did, however, take one step which, while minor in its effect as compared with the over-all problem, was in the direction of conserving surplus Turner Valley gas. In 1930 a plant was installed for the repressuring of surplus Turner Valley gas in the Bow Island field. This plant operated until February 2nd, 1939, when repressuring was discontinued on instructions from the



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Petroleum and Natural Gas Conservation Board as a result of its Board Order No. 5. During this repressuring period some 12 billion cubic feet of gas were stored in Bow Island. Repressuring was recommenced in 1945 with the permission of the Natural Gas Utilities Board.

On November 30th, 1938, the Conservation Board issued its Order No. 3 as a conservation measure setting out the monthly allowable production from some 100 gas wells, and stating that immediately after the 15th of January, 1939, it was the intention of the Board to restrict the production of gas from these wells "to such amount as is for the time used for lighting, heating and the generation of power together with any further amount which is returned to the earth in such manner as may be approved by the Board". On January 28th, 1939, Board Order No. 5 was issued listing the allowable for gas wells, and reiterating "Any gas produced at any gas well which is not used for the purpose of the generation of heat, light or power for domestic or industrial purposes shall be replaced with the minimum amount of loss into the earth at such place or places in such horizon or horizons and in such manner as may be from time to time approved by the Board".

These orders, indicating the intention of the Board to conserve the remaining reserves in Turner Valley, and the beginning of the war, which increased the difficulty of exploring for new gas reserves, were the cause of the Company largely eliminating its geological program for some years.

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Northwestern

Figure 2 is a graph showing by years from 1930 to 1950 the annual gas sales of Northwestern Utilities, Limited. Years earlier than 1930 have been omitted since they were years in which the Company was becoming established subsequent to its first operations in the year 1923. It will be seen that during the depression and pre-war years 1930 to 1939 inclusive the Company's sales increased very modestly from about 3 billion cubic feet per annum to slightly over 3.5 billion cubic feet per annum. During the first part of this period the Company was in serious financial difficulties due mainly to competition of coal at distress prices. The Company was not therefore financially able to spend substantial sums on increasing its gas reserves. Nor did there appear to be any great necessity to do so since it was impossible to foresee at that time the remarkable growth which has occurred since. The Company did, however, in the eastern part of the Viking-Kinsella field carry out geophysical surveys, a diamond drilling program, and the drilling of exploratory wells. In addition the Company acquired during that period additional gas acreage so that by the fall of 1934 it controlled 21% of what is now considered by the Company to be the proven area of the Viking-Kinsella field. This would probably be equivalent in terms of marketable reserves to over 150 billion cubic feet or over 50 years' supply at the then rate of consumption.

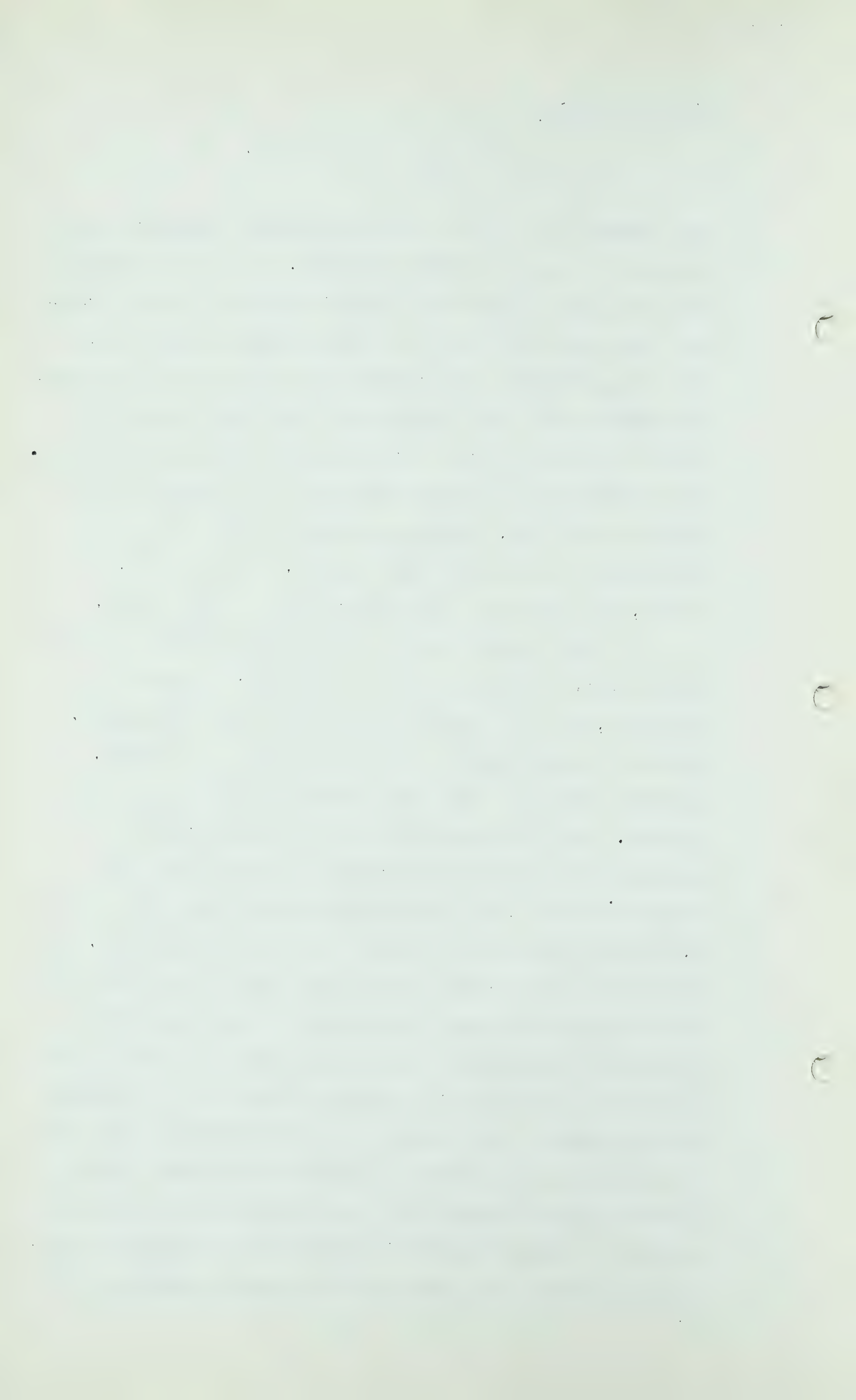
During the war the Company's sales increased at a substantial rate from some 3.5 billion cubic feet per annum in 1939 to about 7.5 billion cubic feet per annum in 1944.

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The increase was due to a very considerable degree to the serving of essential wartime business. It was anticipated that following the war the Company's business would decline and then once more start on a modest upward trend. In the year 1944, however, an agreement was made with the Provincial Government under which substantial additional lands were taken up in the central four townships of the Kinsella field. This increased the Company's reserves to approximately 390 billion cubic feet, or the equivalent at the 1944 rate of consumption of about 50 years' supply. At that time, of course, the question of gas export had not been raised.

The Company's market experience immediately following the war, as in the case of so many gas companies on the continent, was the opposite of what had been anticipated. Instead of declining the sales increased. Furthermore, in 1947 the Leduc oil field was discovered, followed by other strikes. This superimposed on the post-war growth a phenomenal and unexpected increase in business so that between 1944 and 1949 the Company's annual sales rose from 7.5 billion cubic feet to almost 15 billion cubic feet. In the years prior to 1949 Imperial Oil Limited had carried out certain exploratory work to the east of the Company-held portion of the Kinsella field. The purpose of these explorations was to develop a gas supply suitable for a synthetic gasoline plant. This scheme was dropped with the discovery of substantial oil reserves in the Edmonton area. Northwestern therefore carried out negotiations with Imperial Oil Limited to acquire Imperial's holdings in the Kinsella area, and an agreement was concluded which became effective at the



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end of 1949. At the same time, the Company concluded an arrangement with the Hudson's Bay Oil and Gas Company Limited for control of that Company's production in the field. At the beginning of 1950, therefore, the Company controlled practically the entire proven area of the Viking-Kinsella field, constituting a reserve of 612 billions of cubic feet, or on the basis of 1949 consumption over 40 years' supply.

Since 1949 the Company's sales have increased even more remarkably from about 14 billion in 1949 to over 20 billion in 1950, and to what will be close to 24 billion in 1951.

Starting late in 1950 there was a new and important development in the Edmonton market area. The first of numerous inquiries for gas supplies for very large petrochemical industries and other large industrial users of natural gas fuel was received. At least one of these prospects has materialized and the firming up of others could very well result in a market sufficiently large to dwarf the presently existing market. Once more, therefore, the connected reserves in Kinsella are inadequate to meet the needs of this market area.

In the summer of 1950 surplus oil field gas at the outlet of Imperial Oil's gas conservation plant in Leduc became available. The Company constructed a pipeline from Edmonton to Devon to pick up gas at the outlet of Imperial's plant, and constructed in addition at substantial cost a processing plant at Edmonton to make Leduc gas interchangeable with Kinsella gas in consumers' appliances.

In view of the large potential industrial market in

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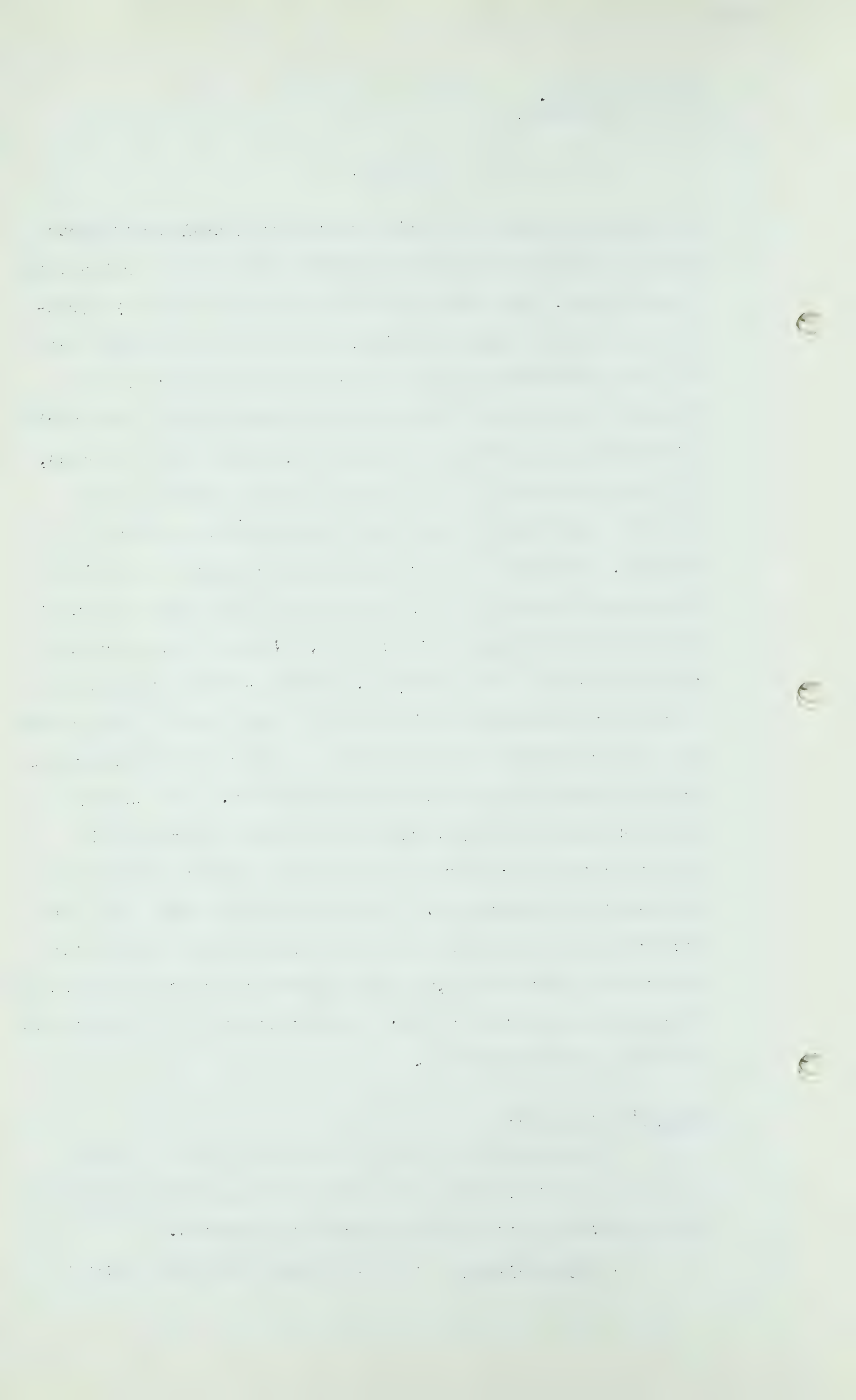
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the Edmonton area the total reserves in Kinsella and Ledue will be inadequate for the Edmonton market area for the long range future. All possible steps are being taken by Northwestern to meet this situation. Starting with studies late in 1950 an effort was made to acquire from Imperial Oil Limited a farmout in the general Legal-Morinville area north of Edmonton amounting to between 100,000 and 200,000 acres, the purpose being to try to block out gas reserves, the possible existence of which was indicated by scattered strikes. This was not possible partly because of previous commitments on the part of Imperial to others who had taken farmouts in the hope of finding oil. While it was much more modest than had been hoped for, a twenty-five square mile farmout was taken in the Legal area, and is now in the course of being developed by Northwestern. Other such arrangements are presently being studied and negotiated. The Company has been approached by various independent operators who hope to develop scattered reserves in a number of areas in the vicinity of Edmonton. Each of these has been told that Northwestern is most anxious to supply a market should such reserves be established, and that Northwestern would be willing to pay in such fields a price consistent with that being paid elsewhere in the Province.

Field Price of Gas

For reference there is outlined below the field price situation in respect to each of the gas pools to which Canadian Western and Northwestern are connected.

1. Turner Valley - For many years under the terms of

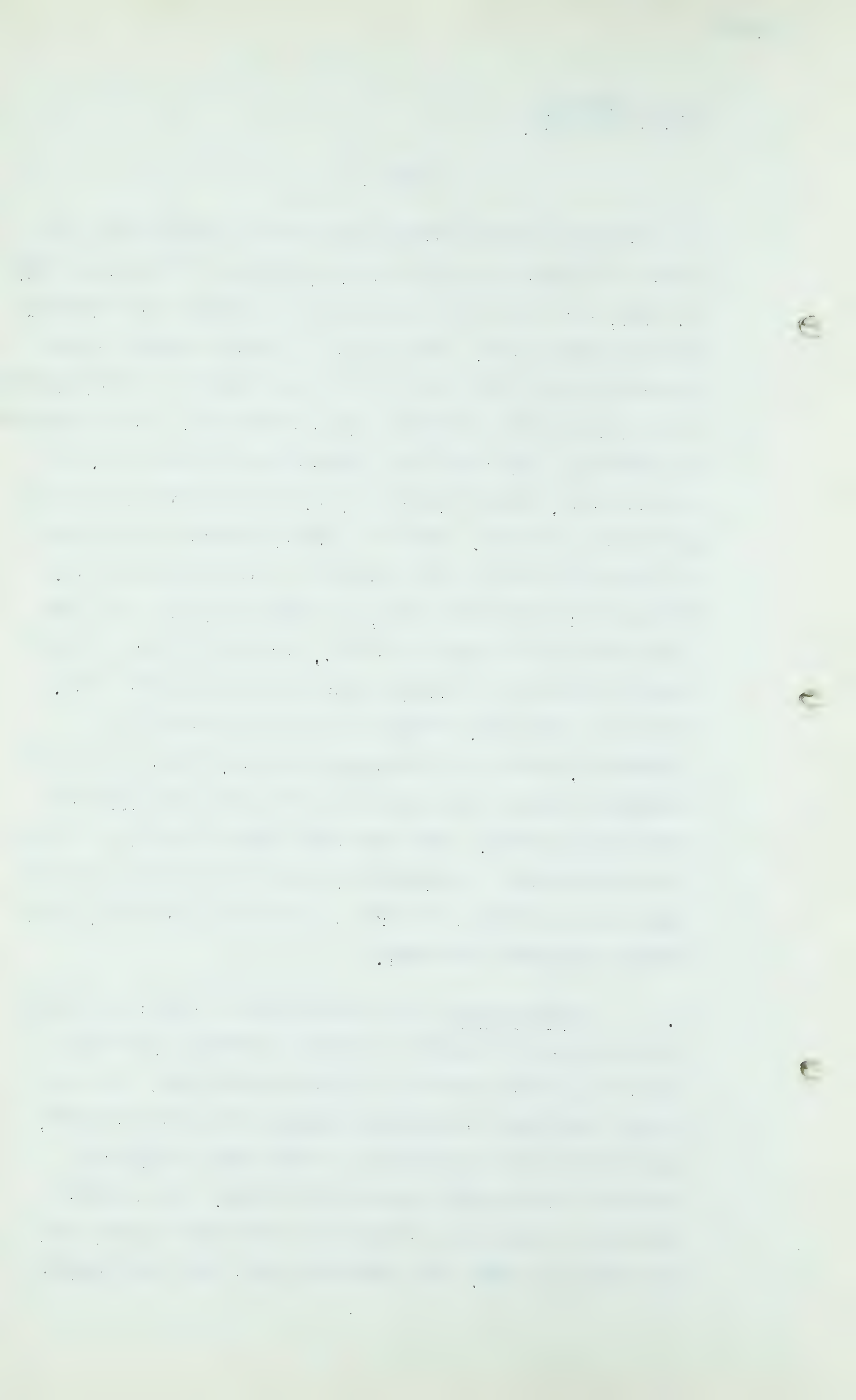


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an agreement between Canadian Western and Royalite the gate price in Turner Valley was 7-3/4¢ per Mcf. Effective January 1, 1947, this price was raised to 9¢ by order of the Natural Gas Utilities Board. This Order followed a lengthy public hearing by the Board, and was for the purpose of defraying the cost of facilities installed under Board Order for the purpose of effecting additional gas conservation in the field. Of the 9¢ price, 3¢ per Mcf was payable to the well owners for gas at the wellhead. Early in 1948 an application was made by the producers for a 3¢ increase in the wellhead price. Effective September 15, 1948, the Board granted a wellhead price increase of 1-3/4¢ per Mcf., raising the gate price to Canadian Western to 10-3/4¢ which has applied ever since. The gas is gathered, stripped of liquid hydrocarbons, dehydrated, scrubbed of hydrogen sulphide, compressed to 300 pounds per square inch and delivered to Canadian Western's transmission lines. The load factor which applied to Turner Valley deliveries to Canadian Western in 1950 was unusually high for that field -- at 63% -- due to the abnormally cold weather throughout the year.

2. Jumping Pound - The price paid by Canadian Western to the Shell Oil Company of Canada for Jumping Pound gas under the present contract is similarly 10-3/4¢. This is for gas gathered with hydrogen sulphide and water removed, and delivered at a pressure up to 750 psig to Canadian Western's transmission lines at the field. The contract calls for a quantity of 20 million cubic feet per day at a load factor of 80%. The reason for this high load factor



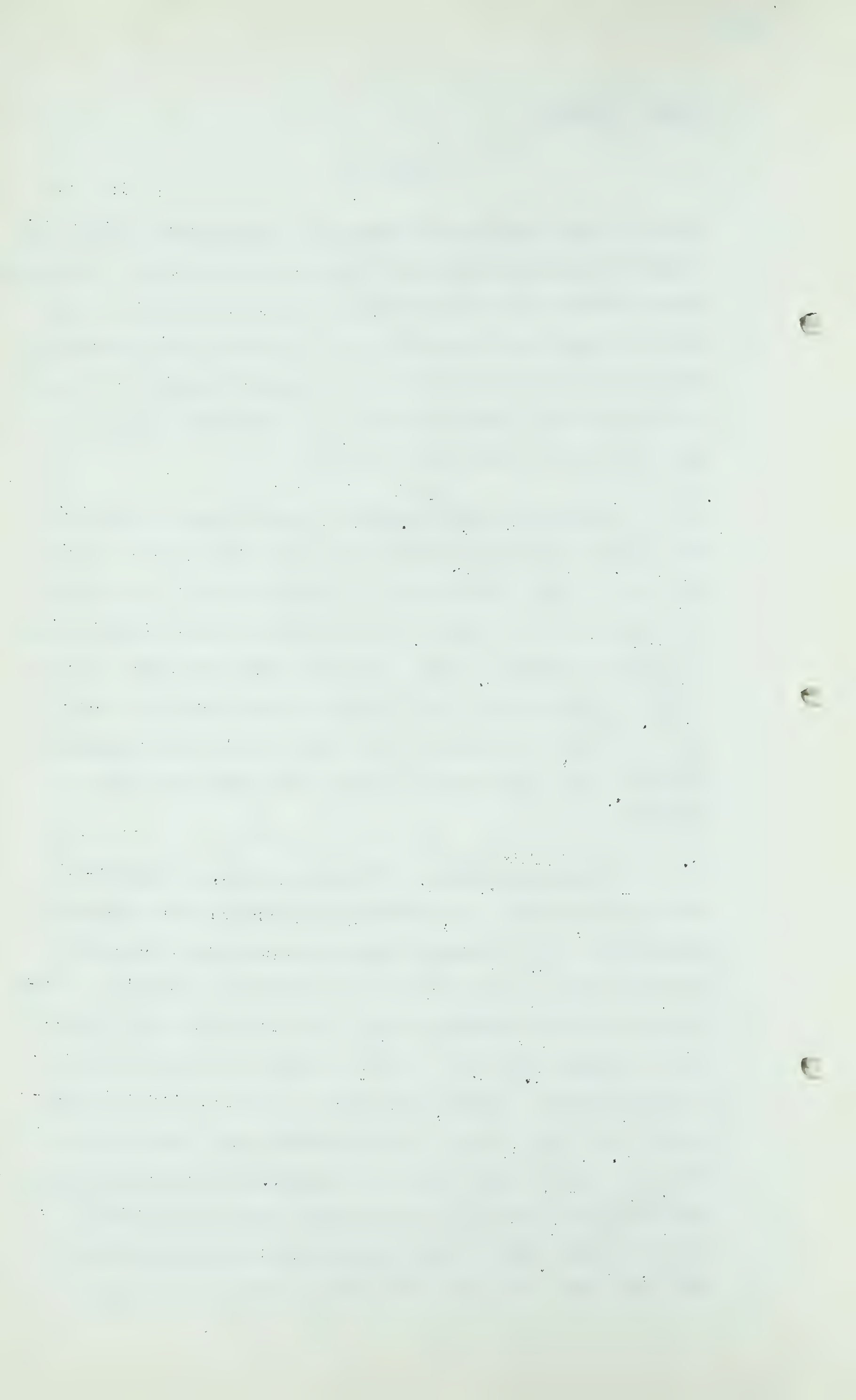
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is that it was considered necessary in respect to the initial block of 20 million cubic feet per day in order that sufficient annual revenue would be provided to cover the heavy initial costs of facilities (including wells, field lines and processing plant), required to put the field into operation. It is anticipated that future blocks of gas contracted for in this field will be at lower load factors.

3. Bow Island and Foremost - These fields are owned by the Canadian Western Company. There is therefore no quoted gas price. The company, being a public utility, is allowed to recover only its costs including the allowed return on its investment in these fields. They are used only when required to meet system peaks. They therefore have a very low load factor, making available to the fields in which the Company purchases gas, load factors higher than would otherwise be possible.

4. Viking-Kinsella - This also is almost entirely a Company-owned field. Northwestern recovers, under utility regulations, only its costs including an allowed return on its investment. Relatively minor quantities of gas are purchased by Northwestern in this field from Hudson's Bay Oil and Gas Company Limited. The price paid is 5¢ per thousand at the wellhead. Hudson's Bay pays for the wells and Northwestern bears all costs, including gathering, from the wellhead on. Hudson's Bay wells share rateably in the market with Northwestern's own wells in the field. The overall load factor in this field in the twelve months ending September, 1951, was 39%. The load factor here is depressed because

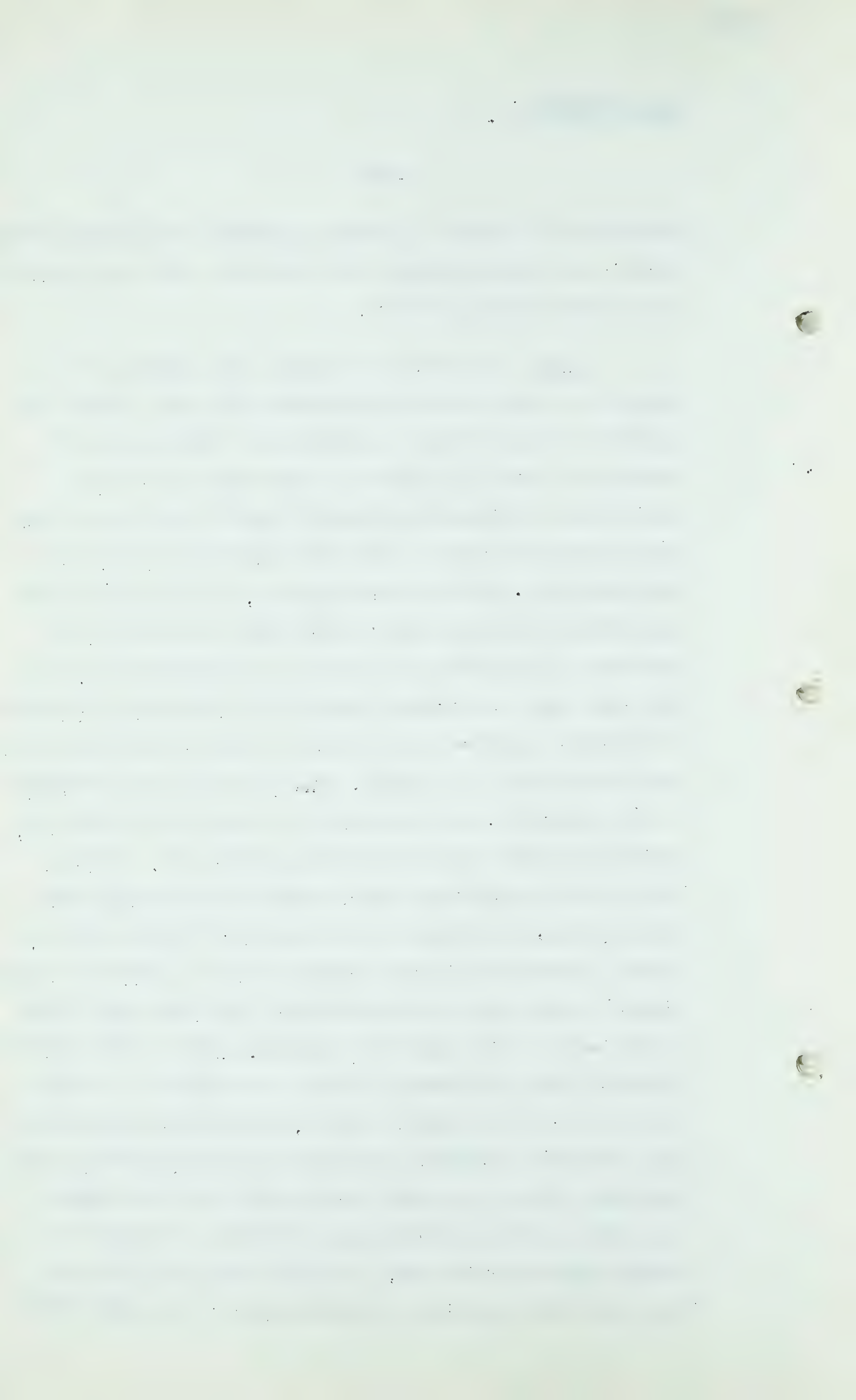


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priority in the market is given to surplus oil field gas from Leduc, the Viking-Kinsella field supplying only that portion of the market which is left.

5. Leduc - The initial contract with Imperial Oil called for a price of 4¢ per thousand cubic feet subject to escalation under certain circumstances. Northwestern is committed to take all residue gas from Imperial's Leduc plant which its Edmonton system can absorb regardless of the time at which it might be available during the year, or of the quantities. As has been indicated, the cost of the gas when served to Northwestern's market was increased by the necessity of processing it to make it interchangeable. It was clear that the extensive facilities installed by Imperial in the Leduc field were not keyed to a utility operation which requires continuity of supply. The gas supply was secondary to oil production, and was subject to complete interruption, possibly at times of Northwestern's winter peak. Substantially larger quantities were available in the summer than in the winter, a reversal of Northwestern's market pattern. Capital expenditures in the Kinsella field to provide for the Company's peak could not be curtailed since Leduc gas could not be relied on for peak load purposes. All of these factors naturally have a depressing effect on the value of the gas at the field. This summer, however, arrangements have been made under which Imperial would make mechanical provision in the Leduc field so that the average daily delivery during the winter months could be largely firmed up to assist in meeting Northwestern's peak, although there will still be more Leduc gas available to Northwestern in the summer than



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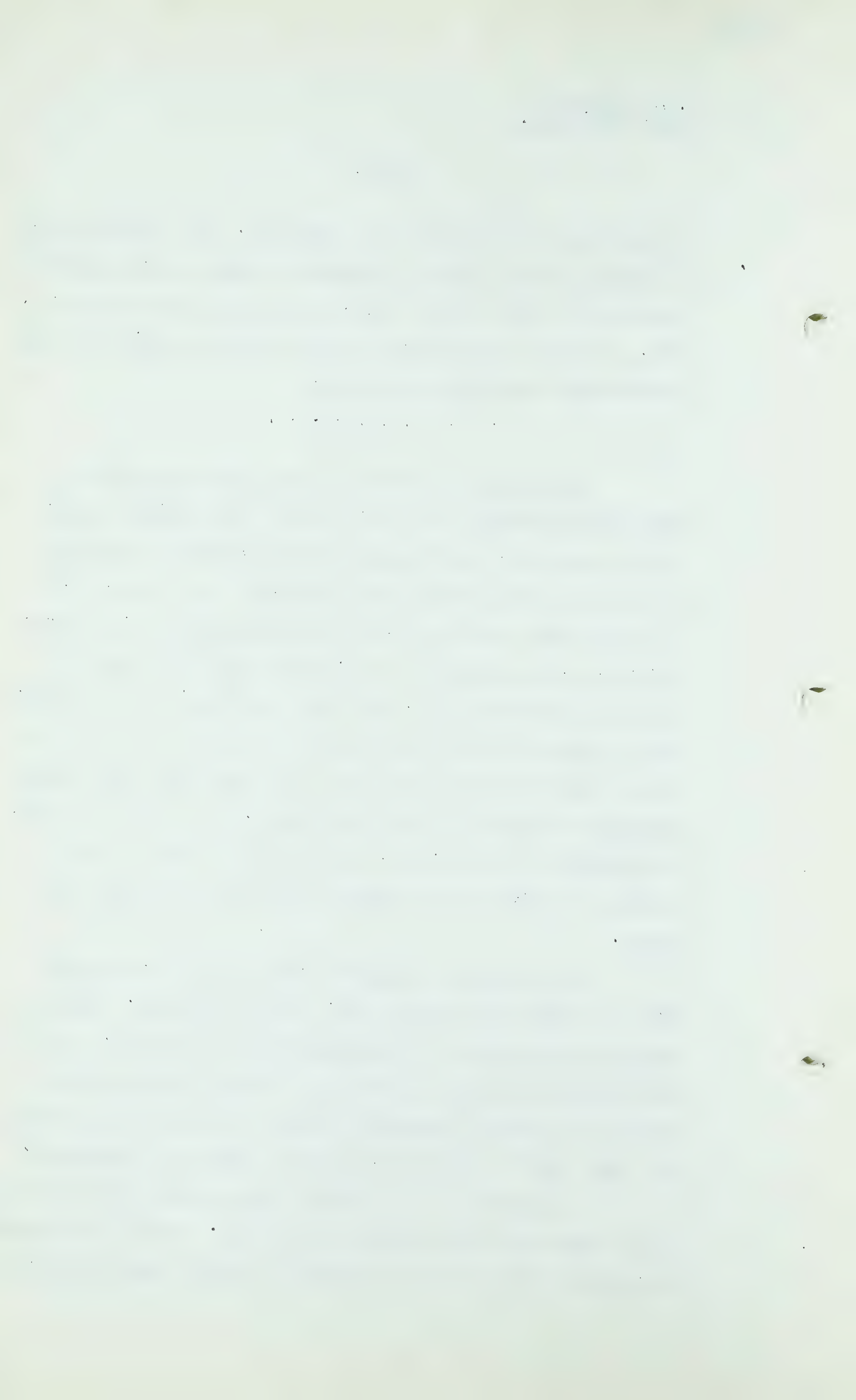
in the winter due to field and other use. In consideration of Imperial making these arrangements Northwestern agreed to increase its price in the Leduc field commencing December 1, 1951, to 7¢ per thousand cubic feet, and the details of this contract are now being worked out.

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Load factor is defined as the percentage figure obtained by dividing the average daily load during a year by the peak daily load during that year, and is a measure of the uniformity of the load throughout the period. It is an important consideration in determining the field price for gas. As an example, if a certain peak daily quantity of gas is contracted for, the field operator's annual revenue will be twice as much with a 100% load factor as it would be with a 50% load factor in spite of the fact that the capital investment required in the field might, for a time at least, be identical in both cases. The effect of this is that an operator can fairly ask a higher price for low load factor sales.

The markets of Canadian Western and Northwestern are to a very large extent space heating markets. This fact results inevitably in a relatively low load factor. This is unfortunate since the use of gas for space heating particularly in domestic premises appears to be the best possible use that could be made of Alberta's natural gas resources.

The matter of load factor has already been referred to in discussing the Jumping Pound field. It was considered necessary in that case in contracting for an initial block to



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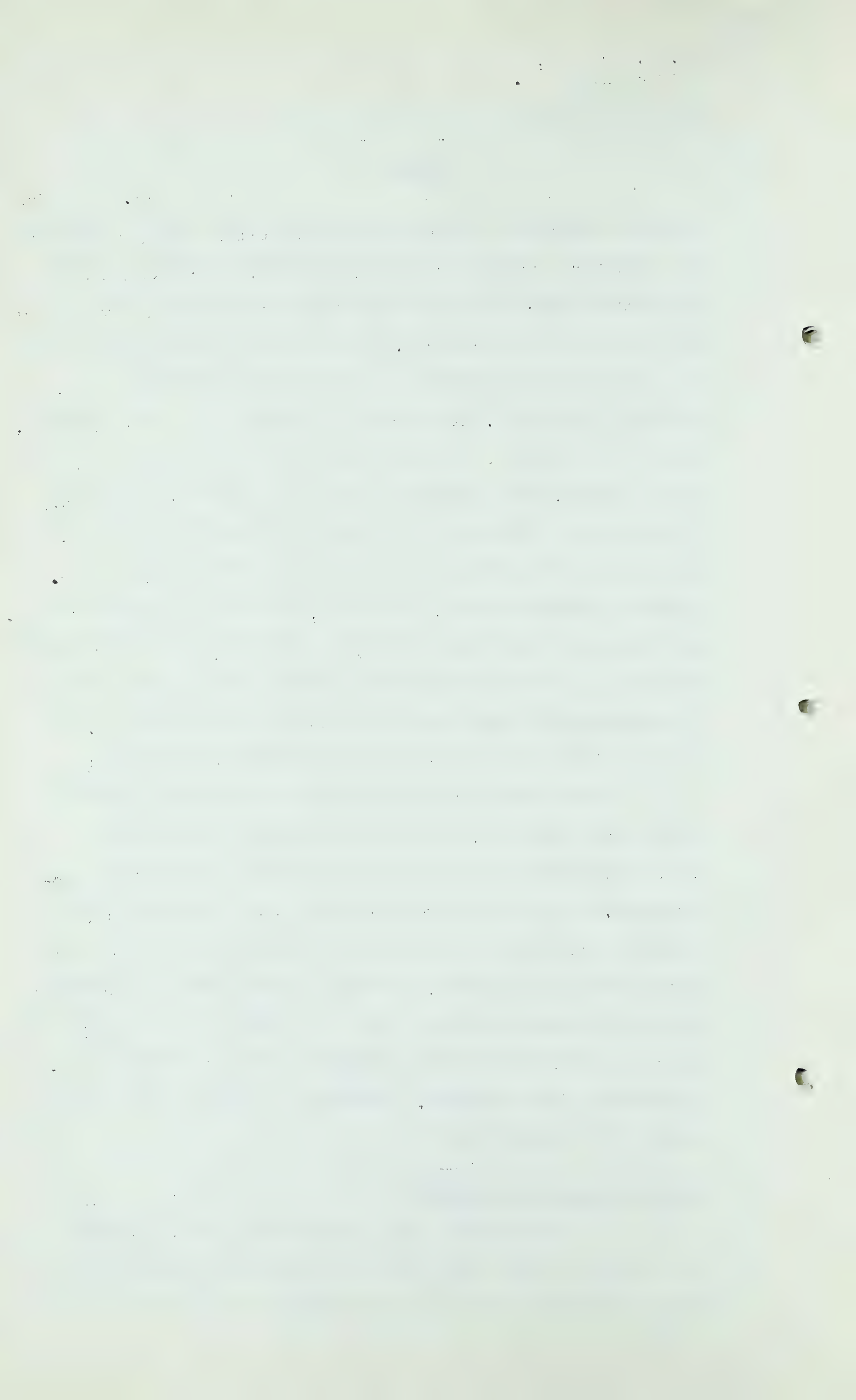
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assign a relatively high load factor to that field. This had the inevitable result of imposing on Turner Valley a poorer load factor than had previously existed, since Canadian Western's over-all system load factor is something over which the Company has no control. It has been pointed out in reference to Leduc that more gas is available in the summer than in the winter. As a matter of fact, the Leduc field is, or will shortly be, providing Edmonton's entire summertime requirements. This makes it more difficult for the Company to contract for new supplies since if a new field is connected no market can be provided for it in the summertime. The taking of Leduc gas, therefore, depresses the load factor available to such new supplies, subject only to the effect of producing the Kinsella field for peaks only and the possible utilization of this field for summertime storage.

Most long distance pipelines were able to achieve relatively high load factors because they serve highly industrialized areas, and it is frequently possible to arrange matters so that a good part of the market is interruptible. The low load factors of Canadian Western and Northwestern are already creating difficulties in arranging for further gas supplies. With the competition of high load factor export business this situation could be seriously aggravated, with resulting increases in retail rates particularly to domestic users.

Implications of Gas Export

No one can deny that proven reserves of natural gas surplus to the long range requirements of present and future consumers in the Province should be sold in the best



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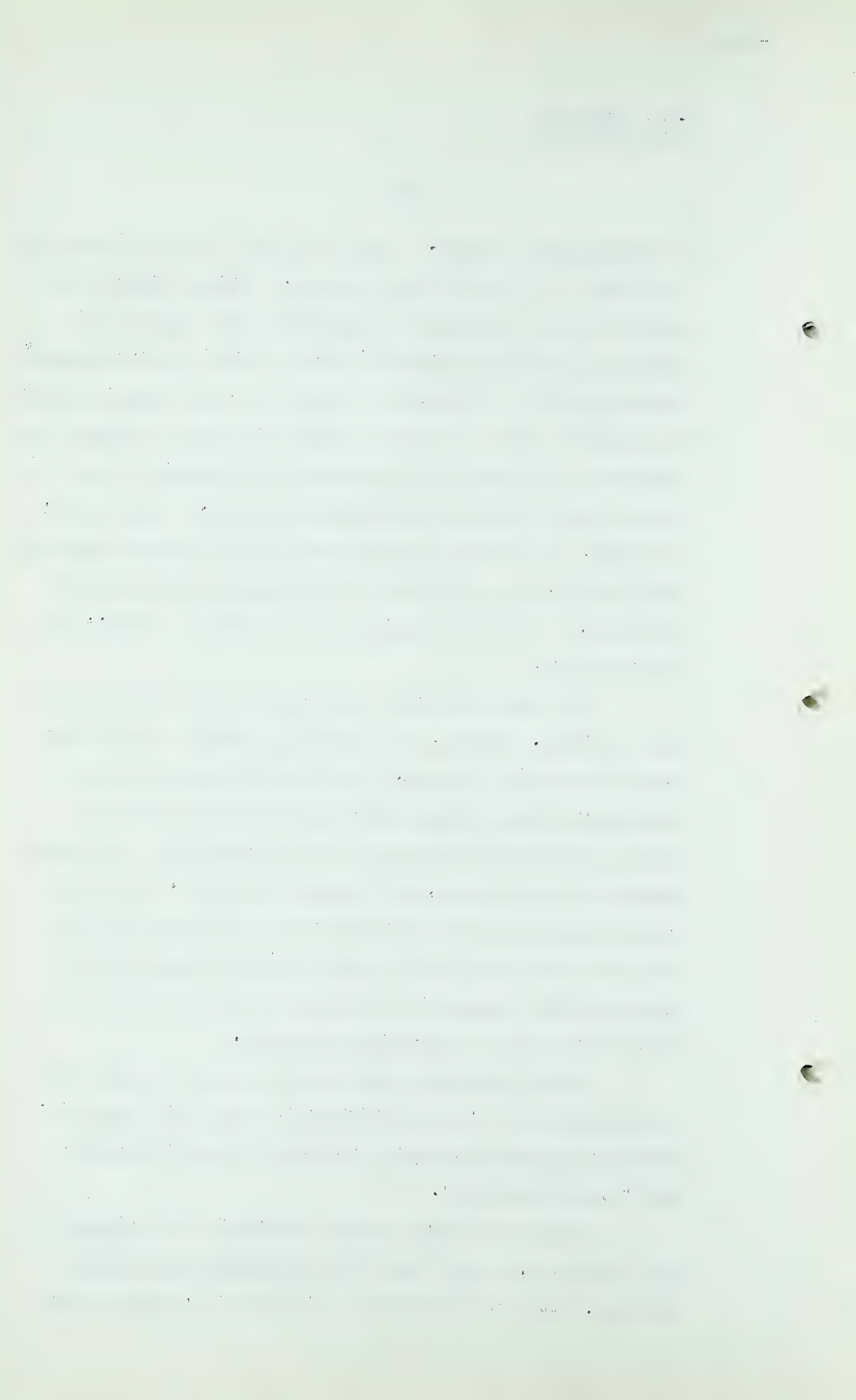
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available export market. This is in the best interests of the people of the Province generally. Premier Manning has stated that gas would not be exported until supplies are available in "super-abundance". With such "super-abundance" there would be no problem as to whether or not export should be permitted and once permitted the necessity to impose restrictive conditions on the exporters for the protection of local consumers would be materially reduced. There might, of course, be internal problems centering on market sharing among fields, the avoidance of unnecessary duplication of pipelines, a suitable geographic allocation of fields, and other matters.

The more difficult problems involved in gas export must be faced, however, if export is permitted before that super-abundance is proven. With export permitted on an unrestricted and unconditional basis in that situation, unless it can be safely assumed that substantial additional reserves will be found, two things may result. The long range requirements of the Province will not be met and/or the local user must face an undue price increase created by competitive buying for a commodity in short supply due to an unreasonably over-extended market.

Basic problems arise from the lack of definition of such terms as "super-abundance", "long range requirements of present and future consumers in the Province", and "proven reserves".

While the term "proven reserves" is at present controversial, in the long run it presents the simplest problem. It will be defined in the first instance by the



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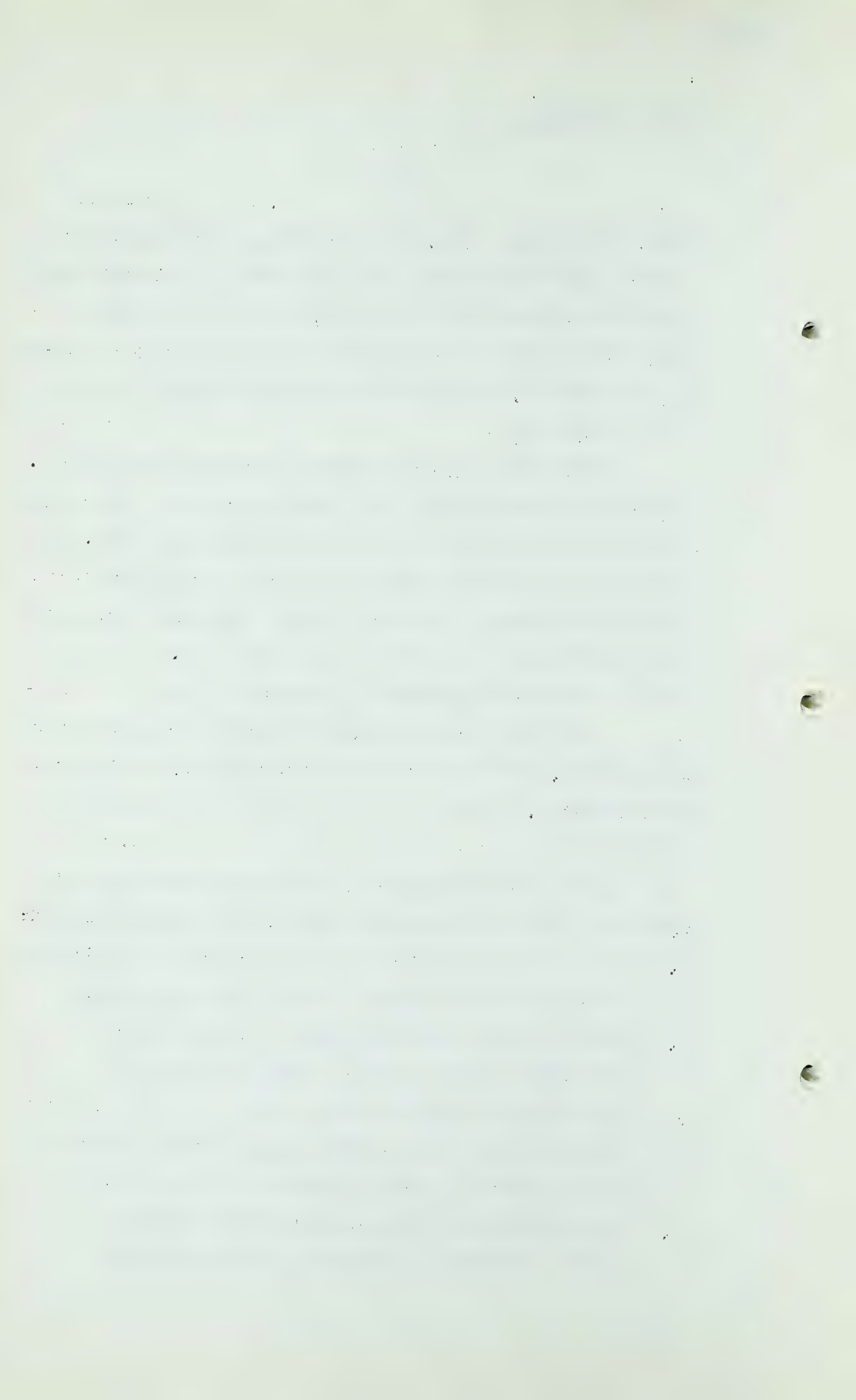
Board and finally, when the time comes, by the people who finance export pipelines. With the help of their advisers they will decide whether the reserves are sufficient to assure the return of their capital, not neglecting the effect of such restrictive conditions as may be applied by Provincial authorities.

"The long range requirements of present and future consumers in the Province" will not be known for many years. They can be estimated now only with the greatest difficulty and such estimates are almost certain to be inaccurate. The problem arises, therefore, whether long range Provincial requirements are to be protected as they actually turn out to be or as they are presently estimated to be.

The term "super-abundance" depends on the relationship between proven reserves and long range local and export requirements. It cannot be defined and is only useful as a generalization.

The specific problems and dangers which must be faced once export is commenced, and the gas industry in the Province greatly expanded as a result, should be summarized:

1. How can the most suitable fields from a geographic point of view be made available to local markets?
2. What steps should be taken to avoid uneconomic duplication of pipeline facilities?
3. In the interests of conservation gas produced primarily for the purpose of recovering oil or other products should receive priority in the over-all market.
4. How can the market be equitably shared among all



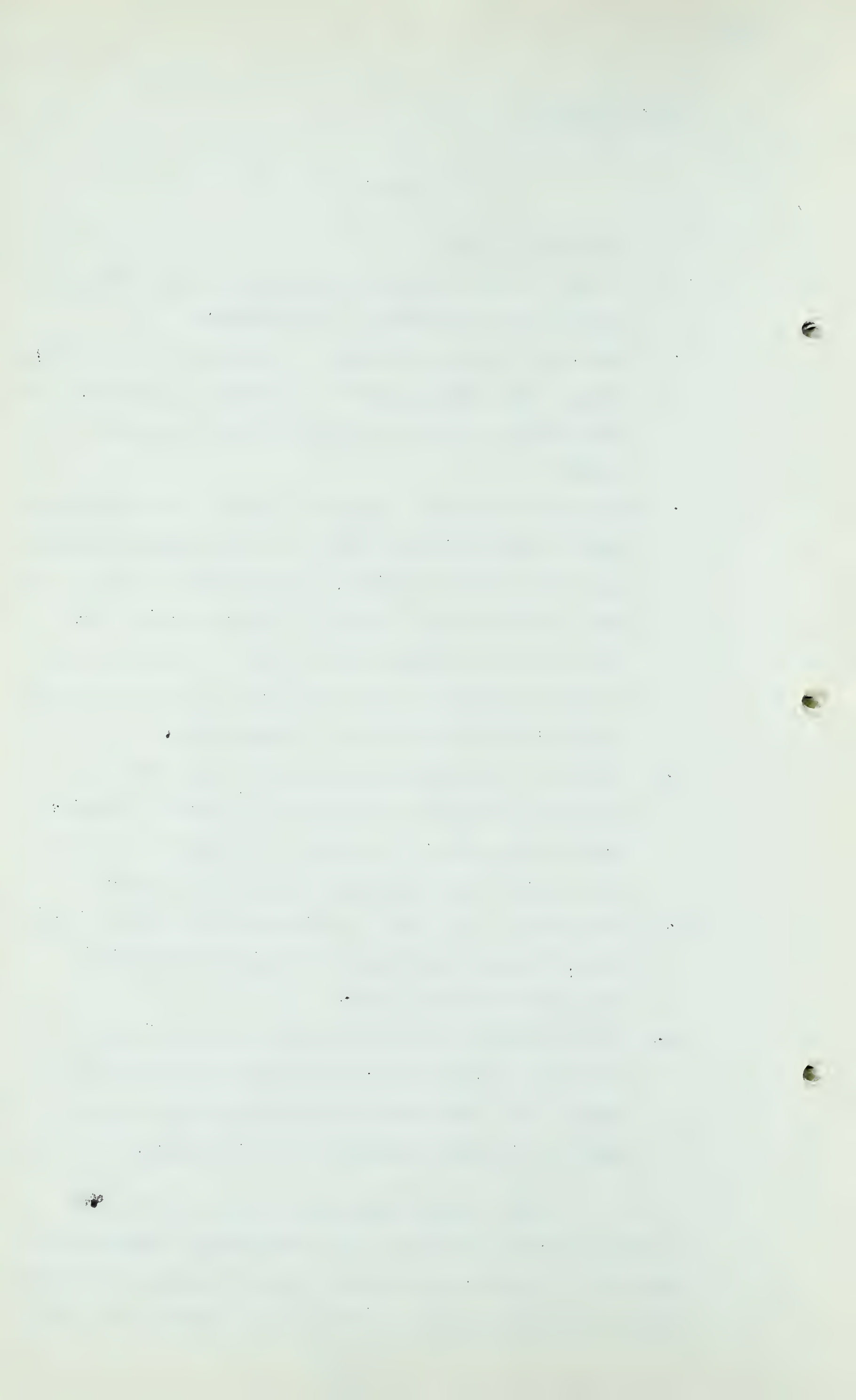
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commercial fields?

5. How can there be assurance that there will always be enough gas for Provincial requirements?
6. What can be done in the way of compensation to fields, the gas from which could be economically gathered, but which for one reason or another have no pipeline outlet?
7. What action should be taken to protect local consumers against price increases resulting from competition by exporters for gas reserves, particularly in view of the more favorable load factors of export outlets? The effect of unduly high field prices in tending to discourage prospective large industrial users from entering the Province should not be overlooked.
8. If it is reasonable and desirable to have both gas export and effective protection for local consumers, how can the latter be achieved in a manner that will still permit the financing of export pipelines?
9. The producer will only be encouraged to search for and develop new gas reserves if he can look forward to being able to market them.
10. Is it desirable or fair that the price in fields connected to Alberta markets should be strictly regulated at a time when fields connected to export markets are free to bargain at arm's length?

It may be asked what can be done by the local utility companies to solve these problems for themselves in the event of export. The local utility companies find themselves in a somewhat rigid situation as compared with newly

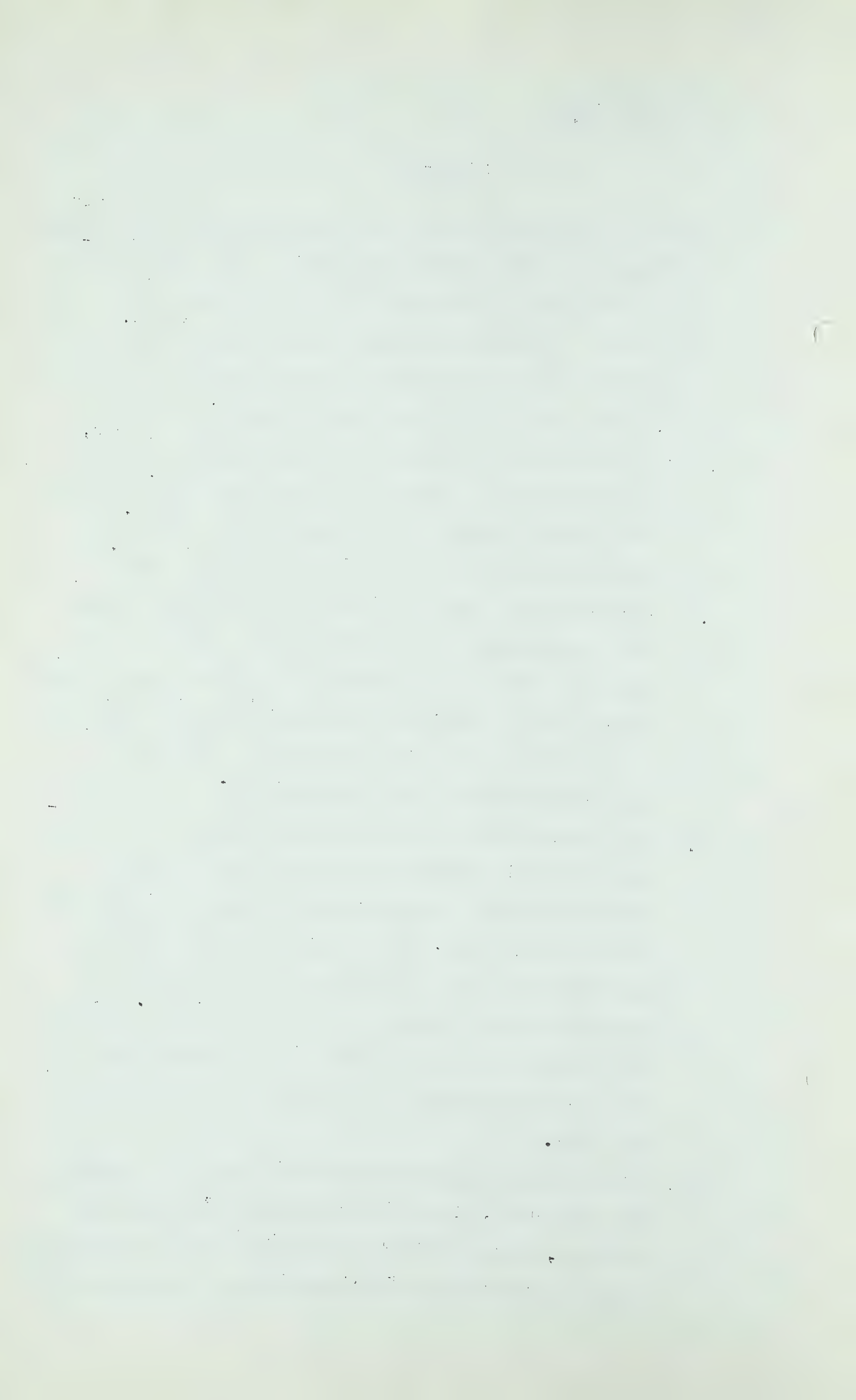


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formed gas enterprises which can tailor from the start their commitments to their over-all situation. This makes it impossible for these utilities to tie up long range gas reserves as a protection against the effects of export. Considerable discussion has already been devoted to this matter, but some of the points may be repeated.

1. Alberta utility companies, like all other businesses, are caught in the spiral of rising costs which, even without the injection of new unfavorable factors, inevitably tends in the direction of higher rates.
2. This situation leaves no room for substantial expenditure on unproductive gas exploration unless rates are to be raised still further. No one can realistically enter a major exploration program without contemplating the probability of a relatively large fraction of exploration dollars being unproductive.
3. The attractiveness of spending risk capital in searching for gas is materially enhanced under ordinary circumstances by the ever-present possibility that oil will be discovered. The spending of money with this possibility in mind is little more appropriate to a regulated utility than it is to a government. Ordinarily a utility does not have the substantial sums of risk capital necessary for a direct or indirect search for oil.
4. Even when the opportunity presents itself to purchase gas reserves, by one means or another, for the long future, some reasonable relationship must be maintained between the amount of such expenditures and prospective



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- market growth. As an example, even if it might be theoretically possible for Canadian Western to purchase the Pincher Creek field for long range purposes the effect on present rates makes the project unthinkable.
5. Both utilities have commitments in existing connected fields which can not be escaped for the purpose of tying up additional supplies. This is particularly true in the case of Canadian Western where commitments in Turner Valley create difficulties in negotiating for supplies from Jumping Pound.
 6. While the gas sales by these companies to domestic users are at rates far below competitive levels, this is not true of large industrial sales. In these cases the competitive margin with other fuels is not wide, and in the case of petrochemical industries gas rates must be set sufficiently low to offset such factors as remoteness of markets and high freight rates if it is practicable to do so.
 7. The loss of large industrial business by virtue of increased rates resulting from substantial expenditures for long range reserves would leave the companies basically with only the low load factor domestic business. This would inevitably still further increase the rates to this class which derives the greatest social benefit from the use of natural gas.
 8. The resulting still further reduction of an already low load factor will intensify the companies' difficulties in competing with exporters and others for

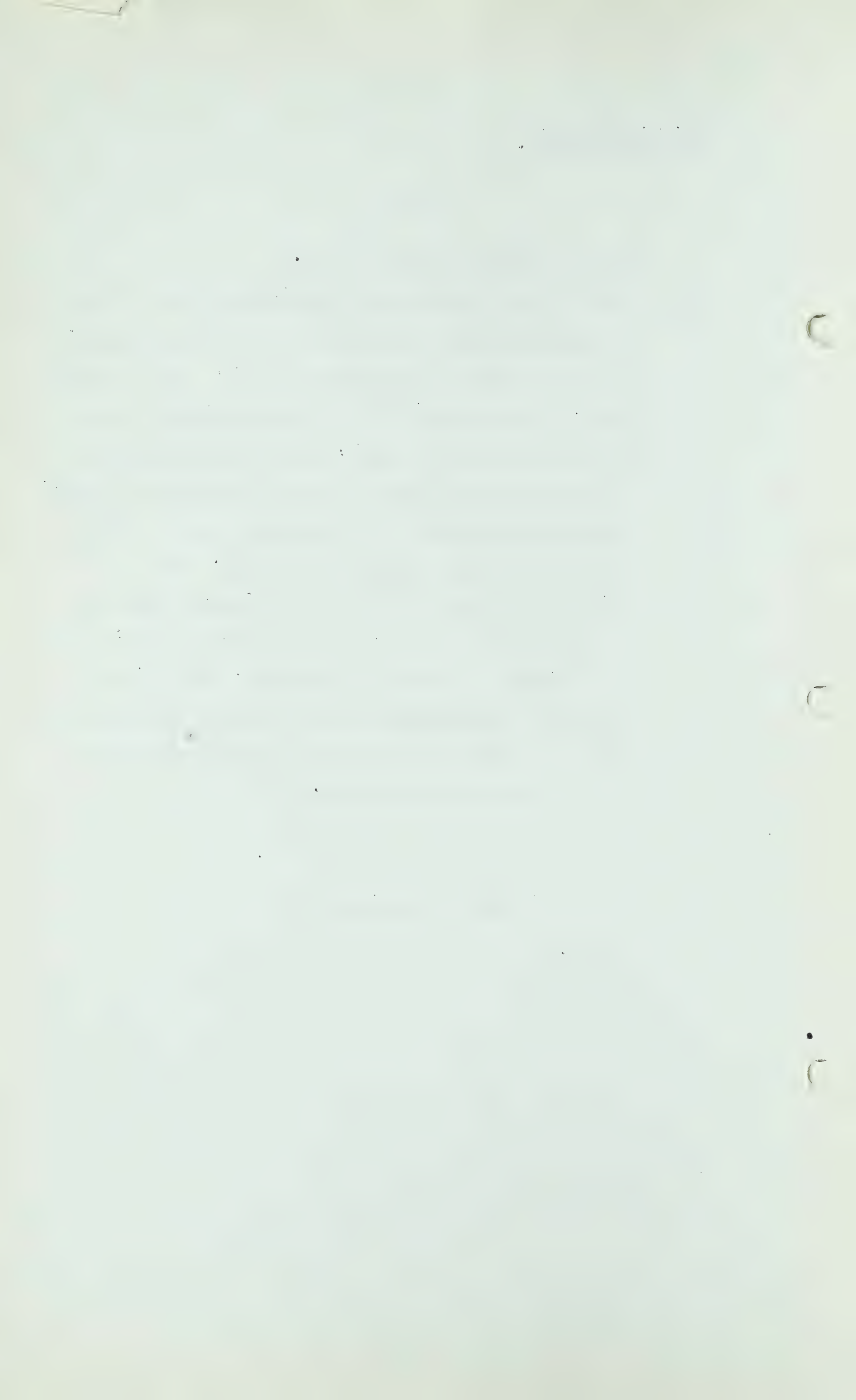
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gas at reasonable field prices.

9. Most of these problems are multiplied during a time of phenomenal market growth such as had been experienced here during the last ten years. As has been noted, Northwestern's sales have multiplied seven-fold in the last ten years, and it is not difficult to appreciate that there is some difficulty in making long range provision for a situation such as this even if it can be reasonably foreseen. This is particularly true in a period of rising costs and rising taxation and when it must be done within the framework of utility regulation. The pattern of utility regulation does not permit violent fluctuations in either rates or net income if expansion is to be reasonably financed.

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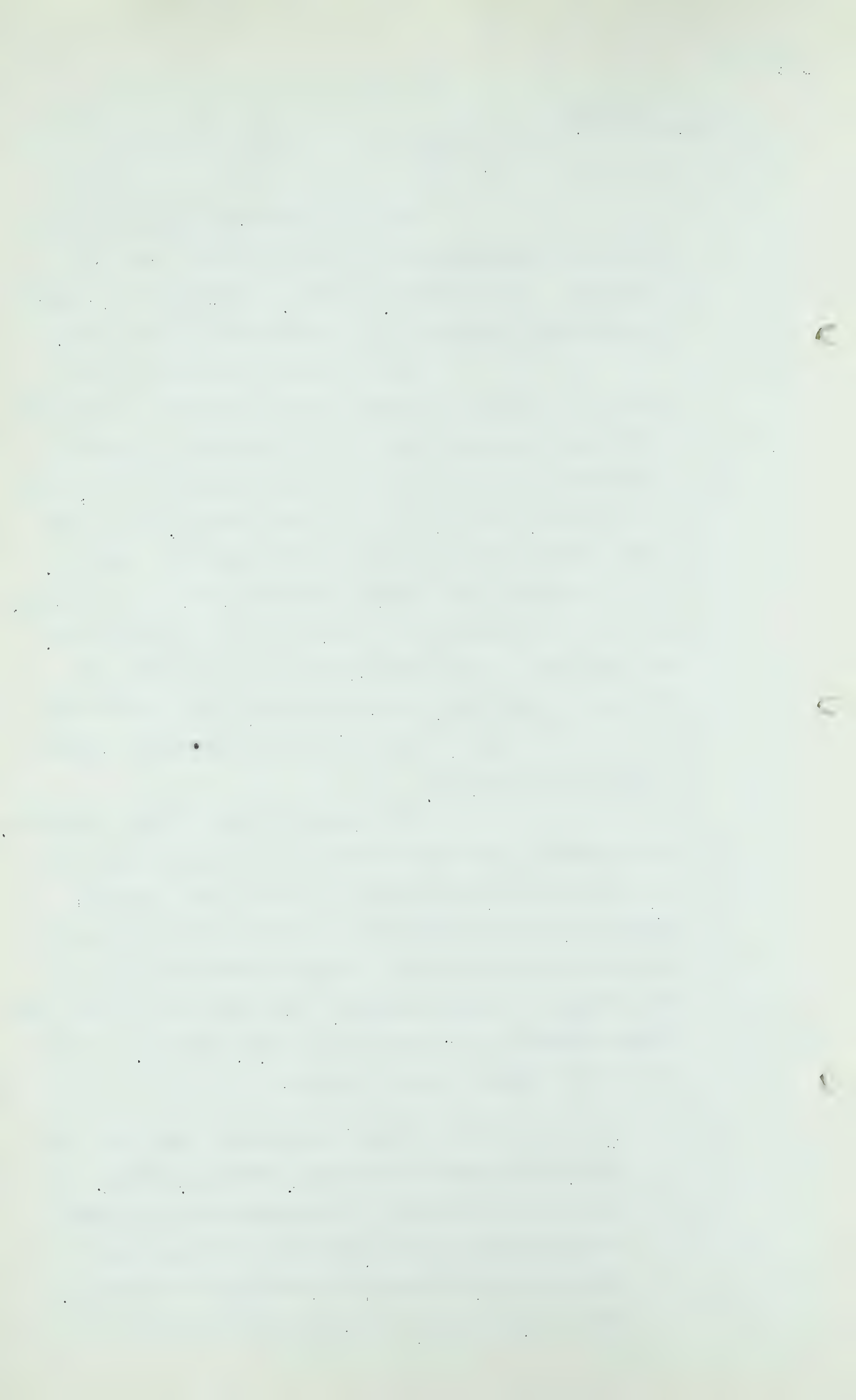
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The local utilities have done and are doing everything within reason to meet their own problems. Their problems, however, are rapidly increasing in difficulty because of the possibility of gas export.

This outlines a situation which cannot be ignored if export is to be permitted in advance of a super-abundant supply. The Government in repeated statements and in The Gas Resources Preservation Act, and the Conservation Board in its interim report, have indicated a grasp of the problem and an anxiety to solve it. If it is agreed that Alberta consumers are to be protected, and if it is agreed that through force of circumstances, with export, the local utilities will be hampered or blocked in protecting their consumers, then the problem can only be solved by some sort of governmentally applied restriction on export.

Such control is not without precedent. One example of the exercise of such control is afforded by the export permit granted in 1946 to the Panhandle Eastern Pipe Line Company by the Federal Power Commission in respect to the delivery of gas by Panhandle to Union Gas Company of Canada Limited. This permit was hedged with restrictions for the protection of U.S. markets. Section (E) of the permit reads as follows:-

"No deliveries of natural gas shall be made to Union during the months of January, February, March, November and December in any year during the term of this authorization. Delivery of natural gas to Union shall be curtailed or interrupted whenever, and to the extent, required for the protection of



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" deliveries of natural gas, either for immediate consumption or for storage, to any and all of Applicant's customers in the United States. The authorization hereby granted shall not constitute ground or justification for any refusal by Applicant to transport or sell natural gas to any person or municipality at any time during the term hereof, either for consumption in the United States by such person or municipality, or for storage, or for resale for ultimate public consumption in the United States for domestic, commercial, industrial or any other use, it being the intent of this authorization that at all times, persons and municipalities in the United States are to receive preferential service over that to Union."

In the result practically no gas was exported for a number of years in spite of the fact that the necessary facilities were constructed at considerable expense to deliver and take the gas. The fact that the restrictions were necessary because of a shortage of steel pipe rather than of gas reserves in no way alters the parallel.

If gas is to be exported unconditionally from an inadequate over-all proven supply it must be on one of two bases, - either that there is a certainty of finding sufficient additional quantities, or that with inadequate ultimate reserves export is to take priority over local needs. No export company has suggested the latter. In fact, most if not all have acquiesced in the principle that Provincial requirements must be protected. Being

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confident in the establishing of adequate reserves and agreeing to the principle of local protection, the export companies should be willing to make the necessary commitments to this end.

There should be no doubt that the protection of local consumers as to supply and price is of far greater importance to the Province than such benefits as might be derived from gas export.

Natural gas service is presently available to about 40% of the total population of the Province, and to about 85% of all those in communities of 300 or more. The benefits to the people of the Province generally resulting from gas export would have to be enormous to warrant jeopardizing the interests of this large group.

The existence of a materially increased pipe line industry in the Province would not of itself be of great importance to Alberta's economy. The two major utility systems at today's price levels would cost in the order of seventy million dollars, and yet apart from construction forces the systems employ only six or seven hundred people. Most of these are employed in local distribution operations not found in large transmission systems.

The existence of a network of pipe lines in the Province will not significantly increase the number of Alberta inhabitants which can be provided with natural gas service. Even in the present situation each year sees the addition of new communities to those already served with natural gas.

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From the point of view of the gas-consuming public, the royalties accruing to the Provincial Government from gas produced for export would be completely offset by an increase of only two or three cents in the retail price to local users. A substantially greater increase in retail rates than this might well result from unrestricted export.

The exploration for and development of Alberta's oil resources are of important financial benefit to the Province. It would be unfortunate if any circumstance tended to stifle these activities. The lack of a market for substantial quantities of gas necessarily produced with oil would be such a factor, with sound conservation enforcement. This appears to be the most important consideration in favour of providing export markets for natural gas.

CONCLUSIONS

The problems involved in gas export have been dealt with in this submission at some length. The finding of satisfactory solutions is difficult, but certain conclusions appear to be inevitable, and these are outlined below.

1. There should be no export of gas from the Province until proven reserves exceed the Board's estimate of Alberta's 30-year requirements including those quantities necessary to assure a 30-year deliverability.
2. When an export permit or permits are issued they should be limited in total quantity to an amount not

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exceeding the surplus of proven reserves over Provincial requirements as defined in Conclusion 1.

3. It should be a condition of the granting of any export permit that the exporter should furnish some form of legally binding undertaking that he will, at all times, give priority over export markets to any local market, at least up to the level of Provincial requirements as defined in Conclusion 1 above, and as set out year by year in the Board's Interim Report. It is recognized that this does not afford complete protection as to supply to present and future Alberta consumers since Provincial requirements might exceed the Board's estimates by amounts greater than the total of future discoveries. Complete protection, however, on an open-ended basis would probably make it impossible to finance an export scheme. The question is whether complete protection should be given to meet the actual future needs of Alberta consumers even though that may be the result. It will be recalled that on numerous occasions protection for a 50-year future period has been suggested. In view of the fact that the Board in its Interim Report selects a 30-year period it might be appropriate to add a factor of safety to the Board's estimate of future requirements.
4. Local users, present or future, should be able to invoke the protection provided in Conclusion 3 against the exporter, not only in the event of an over-all shortage, but in the event that local

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deficiencies can only be made up from more expensive sources than those tapped by the exporter, by reason of remoteness or other factors.

5. There should be future reviews of the whole situation in the event of significant increases in proven reserves in order that the margin of protection provided in Conclusion 3 could, if necessary, be adjusted in the light of more recent information as to future requirements or other considerations. There should be a similar review at the time of any application for a new permit or additional quantities under an existing permit.
6. Fields already connected to local markets should not be invaded by export outlets unless gas so taken is in some manner replaced at no increase in cost to the local markets.
7. The stipulation in Conclusion 6 could be unfair to producers physically connected only to a local market with a relatively limited ability to take gas from such producers. This inequity could be removed by a pooling either actual or assumed of all useful gas fields in the Province to the end that each field shares equitably in the over-all market. This arrangement could also be used to provide fair treatment for useful fields that for economic or other reasons remain temporarily unconnected to any market.
8. Field regulation of price with statutory authority is at the present time an actuality in this Province.

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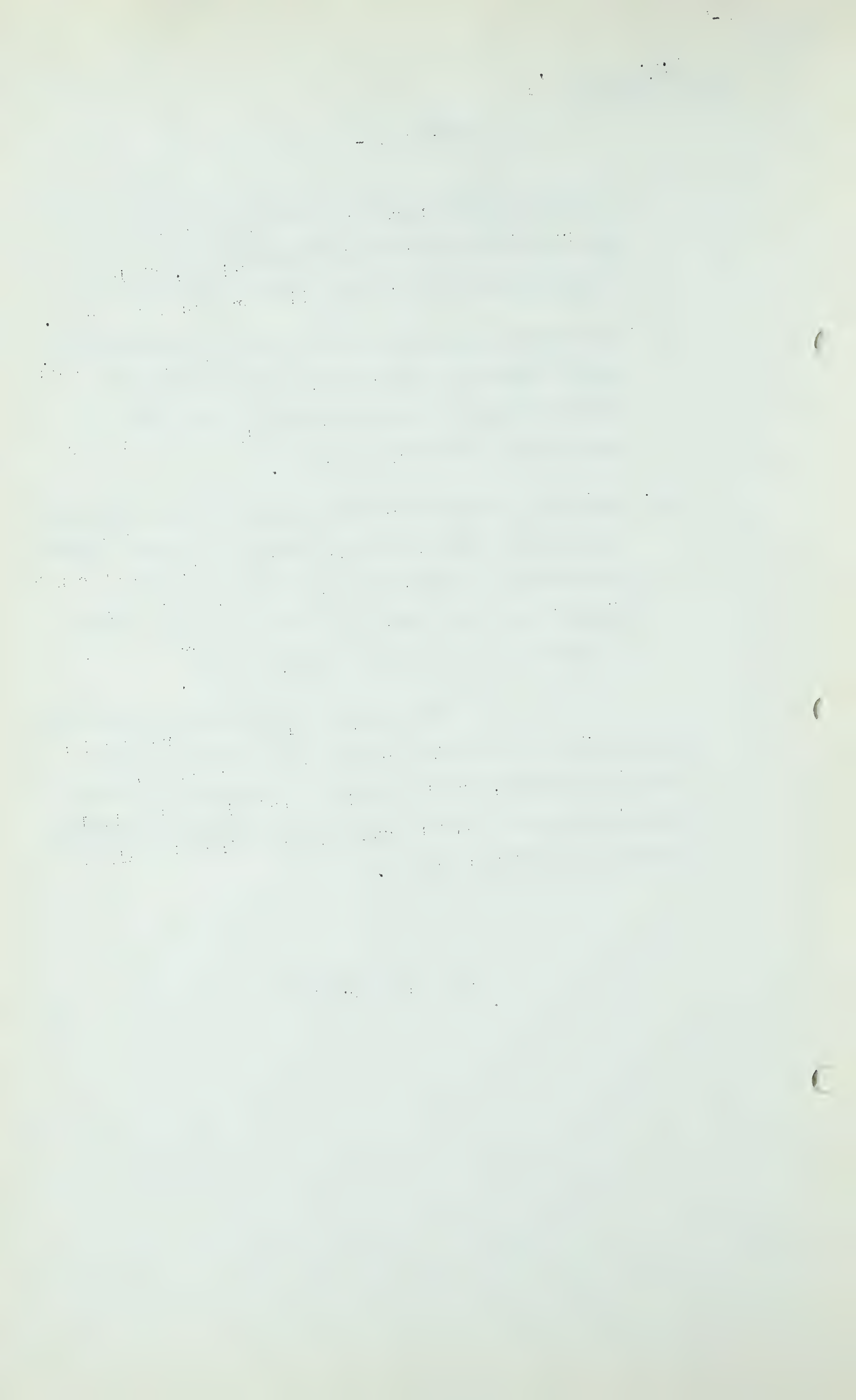
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If local consumers are to be protected against a price increase resulting from export, field regulation must play a still more important role.

9. Such field regulation of price need not necessarily apply to gas sold for export or if it does the export price need not necessarily be the same as that for gas consumed locally.
10. Again the pooling arrangement suggested in Conclusion 7 provides a means whereby equitable treatment can be accorded the producers in all useful fields in respect to a fair share in local and export market if there should be a price differential.

The pooling arrangement referred to in respect to both market sharing and price presents numerous problems, but in the last analysis it is simply an application on a wider scale of the principles already established in Turner Valley.

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THE CHAIRMAN: Does anyone wish to question Mr. Brownie?

MR. C. E. SMITH: I have two or three pages down.

THE CHAIRMAN: Mr. Nolan?

MR. NOLAN: Nothing.

MR. S. B. SMITH: I do not anticipate I will have any questions, but I really have not had an opportunity during the last few days to study this brief. Mr. Steer tells me he would not object to my asking Mr. Brownie to come back later, if I wish to examine him.

MR. MILVAIN: I have no questions, sir.

MR. McDONALD: I haven't any at this point, sir.

EXAMINATION BY MR. C. E. SMITH:

Q I thought I would be last. I wonder if you would look at page 6, Mr. Brownie, about the middle of the page. You refer to a contract with Shell and if you can answer this question, would you tell me whether or not in the contract there is any clause referring to the reserves of Jumping Pound field?

A Stating the reserves?

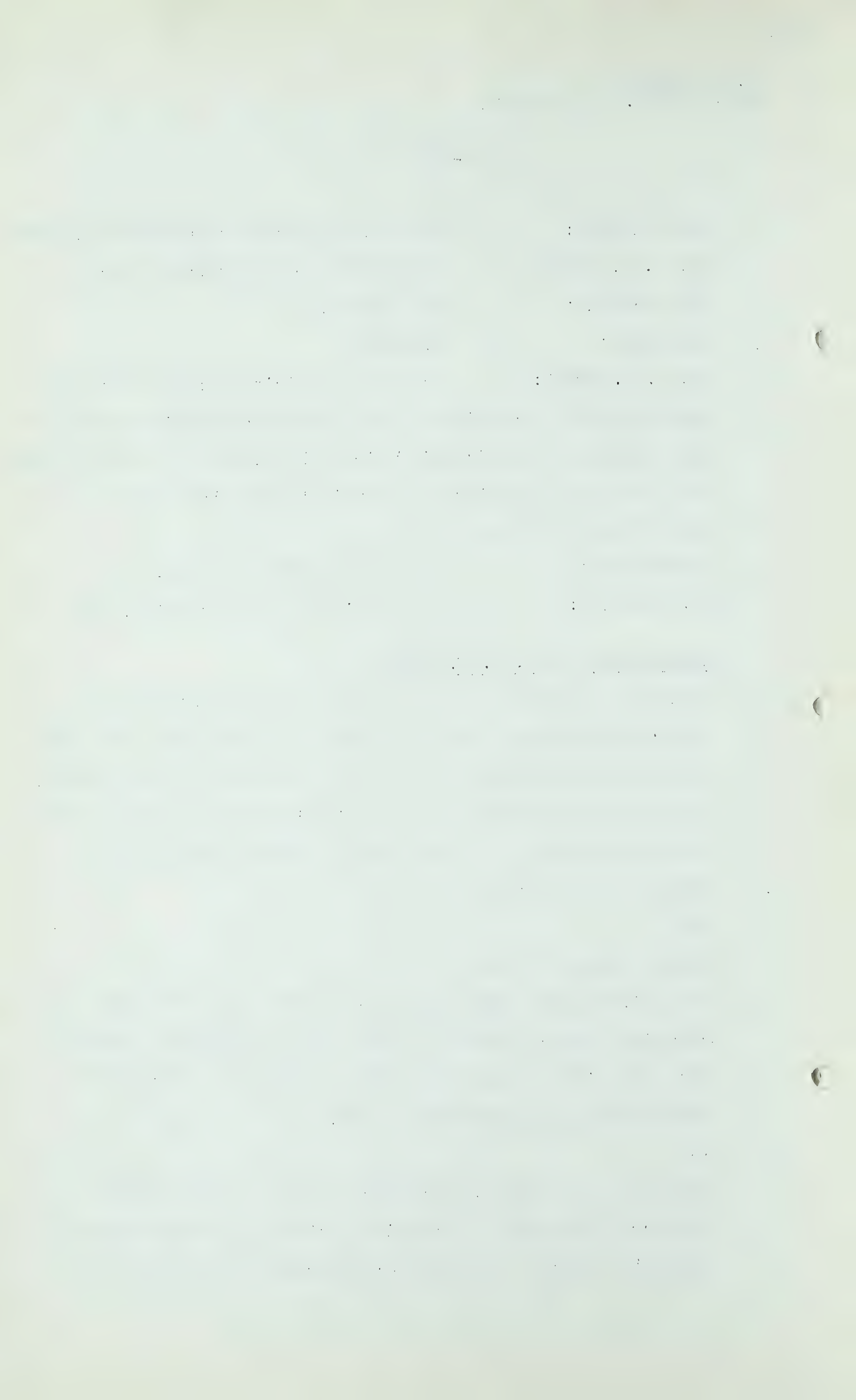
Q Yes?

A No, sir, there is not.

Q You probably know there were some contracts we have seen. There has been reference to reserves, a subsequent figure, what they will be two years hence? There is nothing of that nature in the contract at all?

A No.

Q And on the same page with respect to Bailey-Olds and the reference there made, I take it in view of the date of this submission there is nothing new you can tell the Board in



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connection with that, is that correct or not?

A No, I do not think there is anything new, Mr. Smith. As I understand it, satisfactory progress is being made in negotiating franchises but apart from that there is nothing further.

Q I was particularly interested in anything new on Bailey-Olds?

A No, nothing new.

Q Nothing new since this was prepared, in any event? Now, at the top of page 7 you say this, "Moreover, it appears that companies searching for oil will in the next few years carry out extensive work in this area, and if gas is discovered there seems to be no reason why it should not be available on reasonable terms to the Canadian Western market." Do I take it that that is a statement of policy by your company, namely, that in the meantime at least it would depend primarily upon a search for oil to procure the gas?

A Primarily yes, Mr. Smith, but that does not necessarily mean given a reasonable opportunity we would not participate in a program directed towards finding gas.

Q As a matter of fact, you probably are doing that now, are you?

A Not in this company at the moment, but in Northwestern we are.

Q Well, either one of the two companies you are participating in that way?

A Yes.

Q I think you state that later in your discussion of Northwestern?

A Yes.

Q And referring to page 11, the first complete paragraph there, the first sentence, "In view of the large potential industrial

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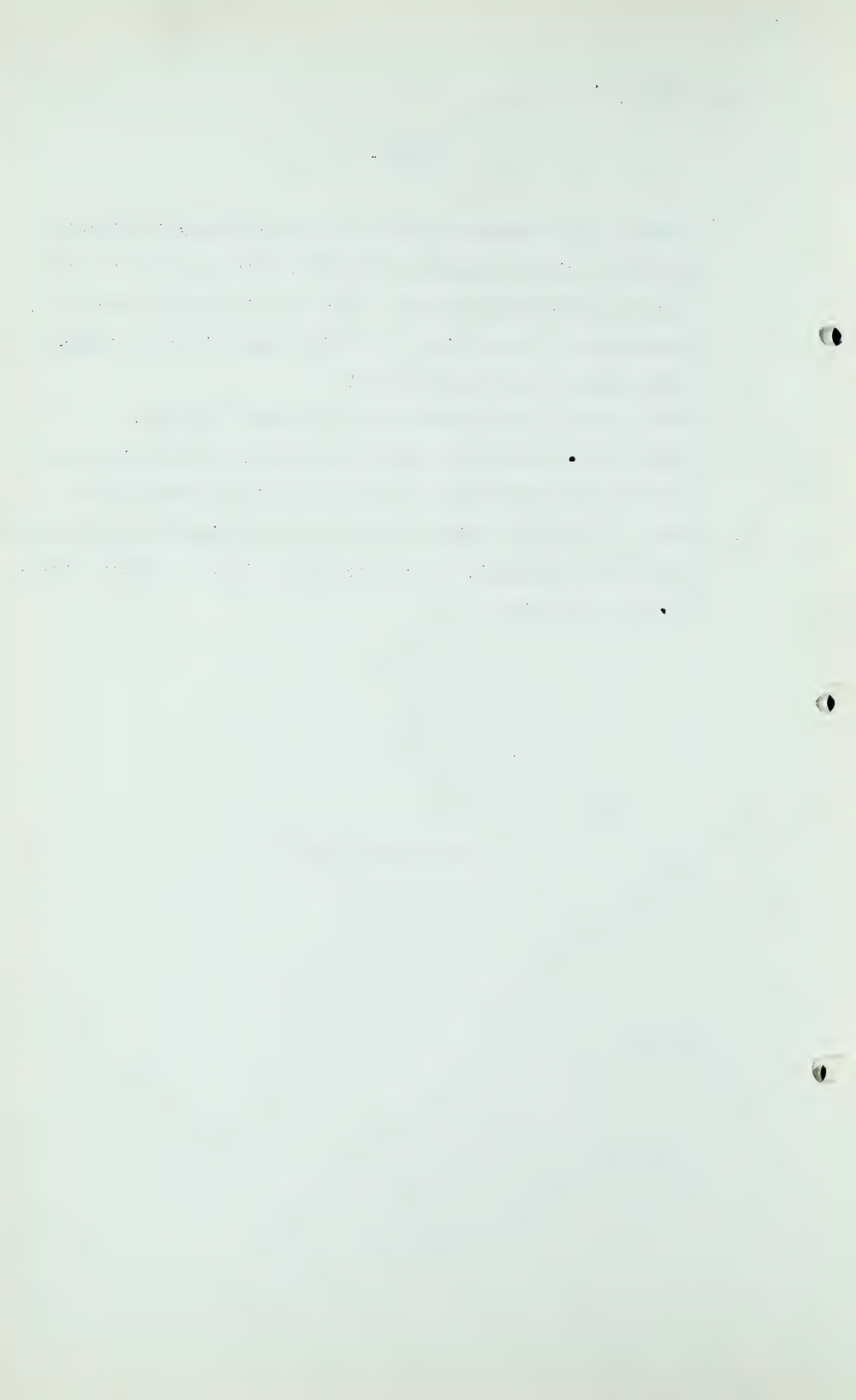
market in the Edmonton area the total reserves in Kinsella and Leduc will be inadequate for the Edmonton market area for the long-range future." Can you give me any sort of a guesstimate, if you like, as to just what the term "long-range future" might mean there?

A Well, I had in mind a period of at least 30 years.

Q Well, do you take that because of what has been said previously in the hearing and in the Board's Interim Report?

A Well, I certainly think it has to be a minimum 30 years, having in mind the necessity of a period that long to effect advantageous financing.

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Q Well, in any event, your answer would be at least 30 years?

A Yes.

Q Is that what you say?

A Yes.

Q Following down lower in that paragraph, you refer to
"a 25 square mile farm-out was taken in the
Legal area, and is now in the course of being
developed by Northwestern."

That is the type of thing which you have referred to a moment ago?

A Yes.

Q And is there anything now that you are free to tell us, or anything that you are able to tell us, about developments with regard to anything of that nature?

A Pardon?

Q Is there anything that you are able to tell us about the developments, or anything of that kind?

A Do you mean as to the experience with the drilling so far?

Q Yes. Maybe you mentioned that the last time you were here, I am not sure?

A I think Mr. Davies might have said something about it.

Q Have you anything to tell us that will be of help to the Board?

A So far we have drilled four wells, and we are now drilling on a fifth. The first well indicated a flow of about 5 million feet in the Viking Sand on the basis of a back-pressure test. It was, as I recall it, quite a thin sand, about two and a half feet. The second well had a similar sand, had a similar drill stem test, but when we made a

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back-pressure test, it was rather disappointing. There was not enough gas in that well to give us the higher points on our curve, and it looks like a well of perhaps one or two million, I do not regard it as a commercial well. In the first of those two wells, I should have mentioned that we had a very small flow in the Lower Cretaceous, not commercial. In the second well there was nothing in the Lower Cretaceous. The third well, which was the furthest north of the three, found nothing in the Viking and nothing in the Lower Cretaceous. The fourth well, which was at the south end of the farm-out block, found no gas in the Viking, but found substantial flows in the Lower Cretaceous, which has been back-pressure tested, and during the test it was apparent that the well was continuing to drill itself in, it was difficult to say just what the indicated open flow was, but it is very large.

Q I take it particularly from what you last said, that you intend to continue your operations with respect to this area?

A Yes, we have an extension of that 25 square mile block to the south, amounting to about 14 square miles, and we are drilling the first well in that block now. It is drilling below the Viking, but found no production in the Viking.

Q That is in the area, as I take it, that is immediately south?

A Immediately south and adjoining the first block.

Q Now, let us go on to page 13. You are there speaking of Viking-Kinsella, and giving us the description, the general description of how it is operated. You say, and this is in the middle of the paragraph,-

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"Hudson's Bay's wells share rateably in the market with Northwestern's own wells in the field."

Can you explain that briefly, how this sharing takes place, Mr. Brownie?

A It is purely on an acreage basis. The percentage of Hudson's Bay's annual market is determined by the ratio of their acreage in the field to the total of their acreage and Northwestern's acreage.

Q When you use the term "acreage", do you mean the total acreage that they have under control?

A The total mineral rights, yes. The total acreage of mineral rights.

Q And that is the way that the sharing takes place?

A Yes.

Q And at page 14, and we are on Leduc now, in the middle of the page, or about a third of the way down the page, this sentence appears:

"This summer, however, arrangements have been made under which Imperial would make mechanical provision in the Leduc field so that the average daily delivery during the winter months could be largely firmed up to assist in meeting Northwestern's peak."

Is there any explanation of that statement that would be of assistance to us here, Mr. Brownie?

A Do you mean as to how it is to be done?

Q Yes?

A As I understand it, Imperial has made arrangements in the

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Woodbend section of the field whereby a well can be repressured with gas during the summer season. I think they have installed some compressors, or a compressor, and such gas as might be taken out of the well for the peak load, perhaps during the winter, will be restored by compressing it back into the well during the summer.

Q That is as you understand it?

A Yes.

Q That is your explanation of what is stated here?

A Yes.

Q And on the next page, page 15 - forget that. I have it crossed out. Coming to page 17, at the bottom of the page, you say:

"The specific problems and dangers which must be faced once export is commenced, and the gas industry in the Province greatly expanded as a result. . "

and so on. I am not sure just what you mean by "and the gas industry in the Province greatly expanded as a result". Have you anything in particular in mind there?

A I had in mind the construction of a large gathering system to serve the export market. Perhaps I had in mind its effect. Perhaps I had in mind Point Number 2 here, and that is not only the expansion of our two systems, but the expansion of gathering facilities to serve an export market, and that might result in an uneconomic duplication of pipe line facilities. I do not know whether there are any more specific points.

Q Just looking at the end, I thought that these export

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applicants would be glad to see it there, -

"and the gas industry in the Province greatly
expanded as a result."

What I am getting at is this, Mr. Brownie, if I had heard
a thing like that, and I was a party that was interested,
I would think that would be a very good thing. I am doubt-
ful from what you say later that you agree with me?

A I think it is a very good thing under certain circumstances.

Q O.K. Now, Number 1, and I am not going to deal with all
of these, -

"How can the most suitable fields from a geographic
point of view be made available to local markets?"

Can you give me any illustration of how you, yourself,
would answer that question in respect to your own company?

A In the event of export?

Q Pardon?

A In the event of export?

Q Oh, let us take that first, then?

A Well, I was trying to answer that, Mr. Smith, in the con-
clusions to this report.

Q Well, I will go into a little more detail. Probably I
misunderstand it. Can you tell us now if some field
could be made available to one of your companies, Mr.
Brownie, because of its geographical position?

A What I had in mind, Mr. Smith, was this, that under circum-
stances which might exist at the time export were commenced,
is through fields relatively close to our system, and econ-
omical from the point of view of location, but fields of such

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a magnitude that we could not contemplate giving them a suitable market, an exporter might come along and offer them a suitable market and take the gas out of the Province, and a few years down the road, when it becomes necessary to augment our supply, we find that we have to go to some remote corner of the Province to get gas.

Q I did not quite follow you there, Mr. Brownie.

"How can the most suitable field from a geographic point of view be made available to local markets"?

As you say, how can it? Will you illustrate it?

A The suggestion I make in the conclusion of this report is that the exporter be required to supply local markets from those most favourably located fields in the event that the local market cannot be looked after more advantageously.

Q Well, as you stated before, that answer is contained further in your submission?

A Yes, in the conclusion.

Q In your conclusions?

A Yes.

Q Number 5, you might expand on that a bit, at the top of page 18, where you ask,-

"How can there be assurance that there will always be enough gas for Provincial requirements?"

Can you give us any suggestion as to your ideas how that can be accomplished, Mr. Brownie?

A Well, again, that is dealt with in the conclusions, Mr. Smith. It is my suggestion here that as a condition precedent to an export permit being granted, the exporter be

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required to make a commitment, with certain limitations, that local requirements be given priority over export requirements from the fields which he has connected.

Q I will go one step further with you. Have you in mind the idea that, for instance, the two gas companies, if I may call them that, should have allocated to them a certain area in this Province, certain fields, and that nobody could touch those fields until you wanted them?

A No.

Q Have you considered that angle or not?

A I think that is a difficult thing to do, Mr. Smith.

Q I think it is, but I was hoping you might be able to help?

A I am afraid I cannot help on that. I would not like to suggest, for instance, that if a very large field were opened up next door to Calgary, that that field would be excluded from an export market.

Q Well, you have given a good illustration, if a large field opens up next door to Calgary you would not expect, or you would not at least, ask that that should be retained in toto until such time as local requirements may need it, is that what you mean?

A No, not as long as we get protection otherwise, as I suggested.

Q You have no anticipation of going into the export business?

A No, sir.

Q As far as we can see from this submission?

A No, sir.

Q There is nothing to prevent you doing so, if you got into the position where you could, I take it, under your charter?

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A I suppose not, Mr. Smith. I have not even bothered to check that.

Q Neither have I.

A We have plenty to do at the moment without that.

Q When you say "plenty to do at the moment", do you mean looking for gas, is that what you mean?

A Well, in every respect.

Q I am going to page 19, Number 4 there, and your last sentence,

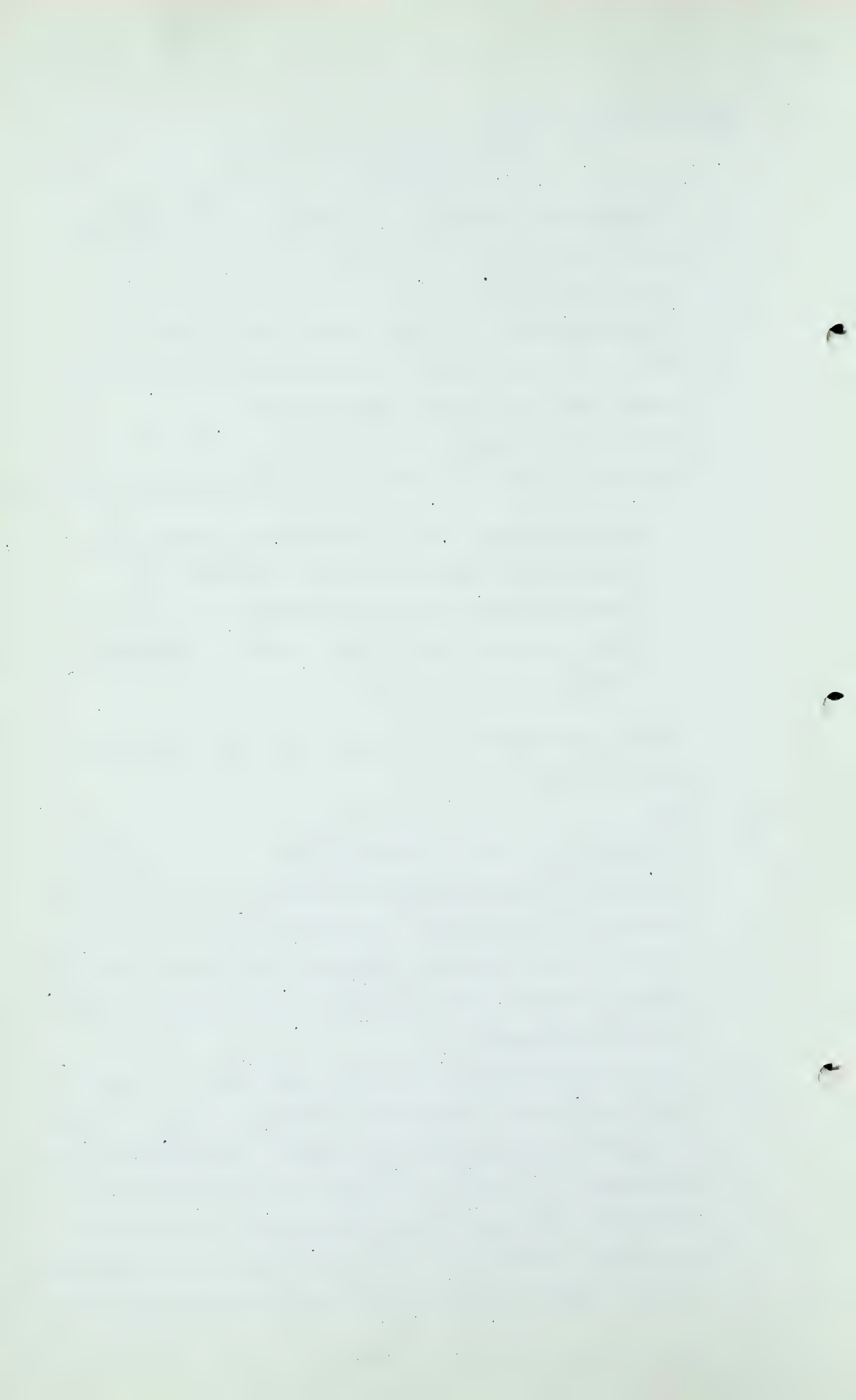
"As an example, even if it might be theoretically possible for Canadian Western to purchase the Pincher Creek field for long range purposes the effect on present rates makes the project unthinkable."

And you have heard Mr. Davis give evidence somewhat along the same line?

A Yes.

Q In fairness to a lot of these gentlemen - I do not know why they are not asking these questions instead of me - in fairness to a lot of these gentlemen, is there any reason, as far as your Company is concerned, why Pincher Creek gas cannot be exported now? Insofar as your Company is concerned, Mr. Brownie?

A I do not believe export should be permitted, Mr. Smith, until it is shown that there is enough gas in the Province proven for our long-range requirements, in accordance with the figures laid down by the Board, and additional proven quantities sufficient to serve the quantity requested by the export company, and after those two conditions are met, that the export company is required to make the necessary



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commitments to give priority to local needs, then I think there is no reason why export should not be permitted.

Q Assuming that the first be true. . .

A I beg your pardon?

Q Assuming that the first be true, I say, just assuming, do you think that the Board has power enough under the present Act, and I know that you have read it, do you think that the Board has power enough under the present Act to provide the conditions which you have mentioned secondly?

A As to the protection?

Q Yes, with regard to the commitments, as you call them of the export company?

A Well, I am not a lawyer, Mr. Smith, but I am informed by what I regard as competent legal advice, that the Act is not sufficiently strong to give us the protection that we require.

Q I take it that you are not talking about Mr. Steer when you say competent legal advice?

A I was not at the moment, not at that moment.

MR. STEER: I have not been asked.

MR. C. E. SMITH: Pardon?

MR. STEER: I have not been asked.

MR. C. E. SMITH: I think we had better fire you.

Q There is one thing, Mr. Brownie, at the bottom of page 20, the very last sentence at the bottom of page 20, and talking about your companies, -

"Their problems, however, are rapidly increasing in difficulty because of the possibility of gas export."

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I take it by that that you mean that since the Act was passed and the applications have been made, you have found it more difficult to make and conclude contracts, is that what you have in mind?

A Yes. I think that trend perhaps occurred before the Act was passed. At the beginning of an active discussion of the possibility of export.

Q That is probably the way I should have put it?

A Yes.

Q Which would be about a year or so before the Act was passed?

A Yes.

Q Was that the idea you had in mind?

A Yes.

Q And about the middle of page 22, this is unimportant, but I want to make sure that there is no typographical error there. I am referring to the paragraph starting with "Natural gas service is presently available to about 40% of the total population of the Province, and to about 85% of all those in communities of 300 or more." Is that correct?

A I believe that is correct.

Q "Available to about 85% of all those in communities of 300 or more"?

A Yes.

Q Presently available?

A Yes.

Q I am not trying to suggest that there is anything wrong, I am just surprised.

A I was surprised myself when I saw that.

Q Thanks for saying that, Mr. Brownie. Then going to

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page 23, and referring to your conclusions on that page, and part 1 thereof, you say,-

"There should be no export of gas from the Province until proven reserves exceed the Board's estimate of Alberta's 30-year requirements including those quantities necessary to assure a 30-year deliverability."

I asked you about Pincher Creek a moment ago, and in fairness to everybody else, I suppose Peace River area is in the same category as Pincher Creek, isn't it?

A Yes.

Q And you have not, at least, at th4 moment you have not considered going up there and bringing gas down because of the rate you would have to ask for that gas, is that right?

A That is correct.

Q And I take it that is true for almost any other areas, and somebody probably will ask you about them. Now, at the bottom of page 24, Part No. 5, Mr. Brownie, and you are familiar with Part No. 5, of course. I was wondering, Mr. Brownie, if, in effect, that means that in your opinion all of these applications should be adjourned sine die, or for some considerable time?

A No, Mr. Smith. I do not propose to express any opinion as to the relationship between the reserves and the requirements, either of local users or export market.

Q Well, I got that as a possibility when you said that there should be a future revision of the whole situation, but you do not want that to refer to any application or applications insofar as this Board is concerned?

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A No.

Q I think that is all. I mean, I have a few more dots and ticks, Mr. Brownie, but if the rest are not interested in you, I should not be too much.

MR. McDONALD: I have a few questions.

MR. C. E. SMITH: Excuse me, I am wrong.

.....

CROSS-EXAMINATION BY MR. McDONALD:

Q Mr. Brownie, we have heard from Ralph E. Davis here, appearing on behalf of the Gas Company, and I am right in assuming that in giving evidence Mr. Davis in expressing or dealing with the technical aspects of this whole problem, that the Gas Company feels that he has been expressing in some measure the opinion of the Gas Company officials themselves?

A Yes.

Q In other words, I do not see much difference from what you have set out in this submission which has been filed now with the over-all views expressed by Mr. Davis?

A Oh, I do not think there is very much difference.

Q He has dealt in detail with specific problems, but my off-handed conclusion is that the statements he made, that the conclusions that he reached, and the recommendations that he placed before the Board, are in a large measure expressed in this document which has been filed here?

A I think that is correct, Mr. McDonald, although I would not say that Mr. Davis and I necessarily always have the same views.

Q No, I am not suggesting that, Mr. Brownie, but on the over-all program, he did appear for your Company, and he did deal

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with the technical aspects of the problems that you have discussed here?

A Yes.

MR. STEER: He had nothing to do with the preparation of this document.

MR. McDONALD: Well, I am not suggesting that.

Q Can you recollect, Mr. Brownie, in any real substantial point where you differ in this document with Mr. Davis,, or in his expressions before the Board?

A No, I cannot, Mr. McDonald, although there may have been numerous places where we have disagreed, although, to answer your question, generally speaking, I think his ideas were the same as mine.

Q Now, as I take it, the general conclusion which I can draw,. Mr. Brownie, is that your Gas Companies, or Gas Company, and you are representing the two, are not opposed to export of natural gas from the Province provided reasonable provision is made for the future requirements of the Province?

A That is correct.

Q And turning to page 24, Mr. Brownie, you have pointed out that the problem is whether complete protection should be given to the actual future needs of Alberta consumers. As I take it, having regard to that, the policy that you are advocating is that reasonable steps should be taken to meet the future requirements of the Province; and you go on in the same paragraph and suggest that it might be appropriate to add a factor of safety to the Board's estimate of future requirements of the 30-year period?

A Yes.

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Q So that then it is left to the Board, I would say, that they use reasonable judgment that it would not be detrimental to the interests of the consumers that are attached to the Gas Company?

A Yes.

MR. C. E. SMITH: I thought you were going to say if they used reasonable judgment nobody would kick.

MR. BREDIN: I wonder if I might ask one or two questions?

THE CHAIRMAN: Yes.

.....

CROSS-EXAMINATION BY MR. BREDIN:

Q Mr. Brownie, on page 19, in Clause 5, you say this,-

"This is particularly true in the case of Canadian Western where commitments in Turner Valley create difficulties in negotiating for supplies from Jumping Pound."

Can you tell me briefly what those commitments are?

A Where was that, Mr. Bredin?

Q That is at the bottom of page 19, Clause 5?

A The Canadian Western Company buys gas from the Turner Valley fields from the Madison Natural Gas Company, who, in turn, purchased gas from the producers. . All operations in that field are, by statute, public utilities. The Madison Company is regulated in the same way that we are. They are allowed a rate of return on a rate base, and they have certain fixed costs. If we reduced our take from Turner Valley by assigning part of our market to another

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field, it is quite conceivable that the Madison Company could apply to the Board for a review of their situation, and it might be that with a lowered take and relatively fixed costs, the unit price might go up. That is what I had in mind when I talked about commitments at Turner Valley.

Q In a brief which has been delivered, but has not yet been presented, of Alberta Inter-Field Gas Lines, it states that the Canadian Western has given the scheme of Alberta Inter-Field Gas Lines unqualified approval, and are prepared to offer substantial backing. Can you tell me how much backing Canadian Western is prepared to give Alberta Inter-Field Gas Lines Limited?

A That is a question that is very difficult to answer, Mr. Bredin; that would depend on the circumstances at the time, I think.

Q But the statement that the Company's unqualified approval has been given is correct?

A That is correct.

.....

EXAMINATION BY MR. GOODALL:

Q Mr. Brownie, when you were replying to Mr. Smith, you discussed the Northwestern's development of the Legal area, and there was one well, I believe you mentioned, had an open flow of 2 million feet, and you expressed the opinion that it was not commercial?

A I said one or two million, I think, Mr. Goodall. The fact is that we are not able to get enough gas out of the well to give us a decent back-pressure test.

Q 1 or 2 million with open flow, is that right?

A Yes.

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Q Would you tell the Board just what you consider a commercial well with respect to this Northwestern's development, that is, developing your own supply of gas for your own market?

A Well, again, that is a difficult question to answer, Mr. Goodall; but I might say this, that in Kinsella there is a well, Number 9, which was drilled about 10 years ago, and it has got a flow of about 3 million feet, and it is right in the middle of the field, an open flow of 3 million feet, and I think it is only half a mile from the gathering system, and we have never thought it worth while connecting.

Q Is that because you do not think the deliverability would be sufficient to warrant the line, or that you thought it would be drained anyway from some other and better producers?

A Both of those reasons, and a third, the nuisance of operating such a small well in the winter time makes it inadvisable to connect it up.

Q Thank you.

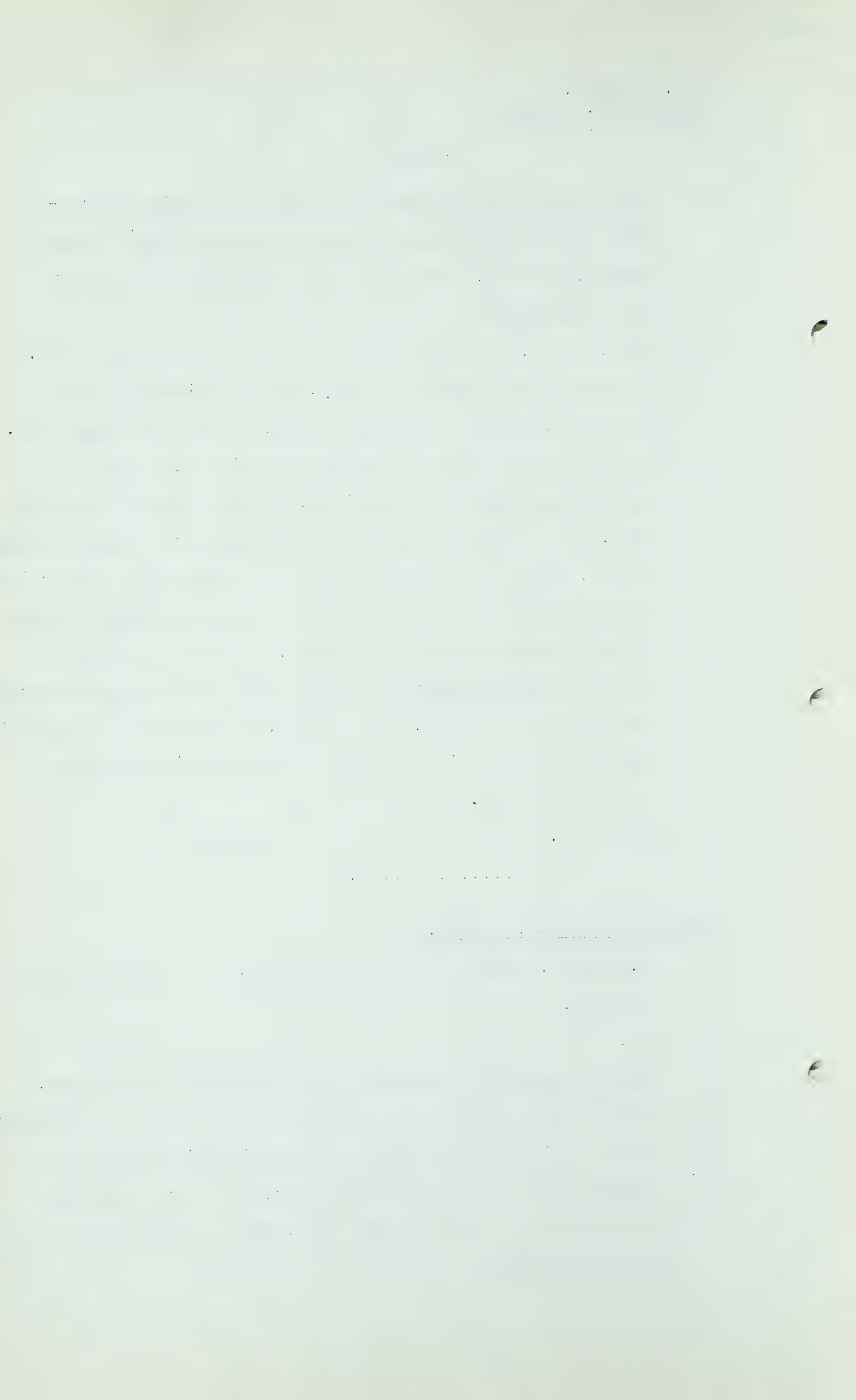
.....

EXAMINATION BY DR. GOVIER:

Q Mr.Brownie, would you turn to page 23, which is your conclusions?

A Yes.

Q I want to ask you a question about the first conclusion, and ask you whether it is your intention that this statement should be interpreted as being qualified with respect to geographical locations of the reserves? I am thinking particularly of your answer to Mr. Smith in connection with Pincher Creek?



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A I am not sure that I understand your question, Dr. Govier. Are you asking me if with regard to gas of Pincher Creek's geographical location I would exclude that from the application of this point No. 1?

Q Not quite. What I was asking, in other words, is this: Does Point No. 1 mean proven reserves within economic reach of your system as defined by yourself, because, apparently, you intended not to include Pincher Creek, at least, to some extent?

A No, I would include Pincher Creek in No. 1.

(Go to page 2717)



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Q You would include Pincher Creek in Number 1?

A I would, yes.

Q And that despite your previous comment in connection with Pincher Creek. That is the point I don't understand, Mr. Brownie. Your position is not particularly clear there, I don't think. Could you refer me to the part in your brief where you mention Pincher Creek?

MR. BREDIN: Page 19, I think.

A Number 4.

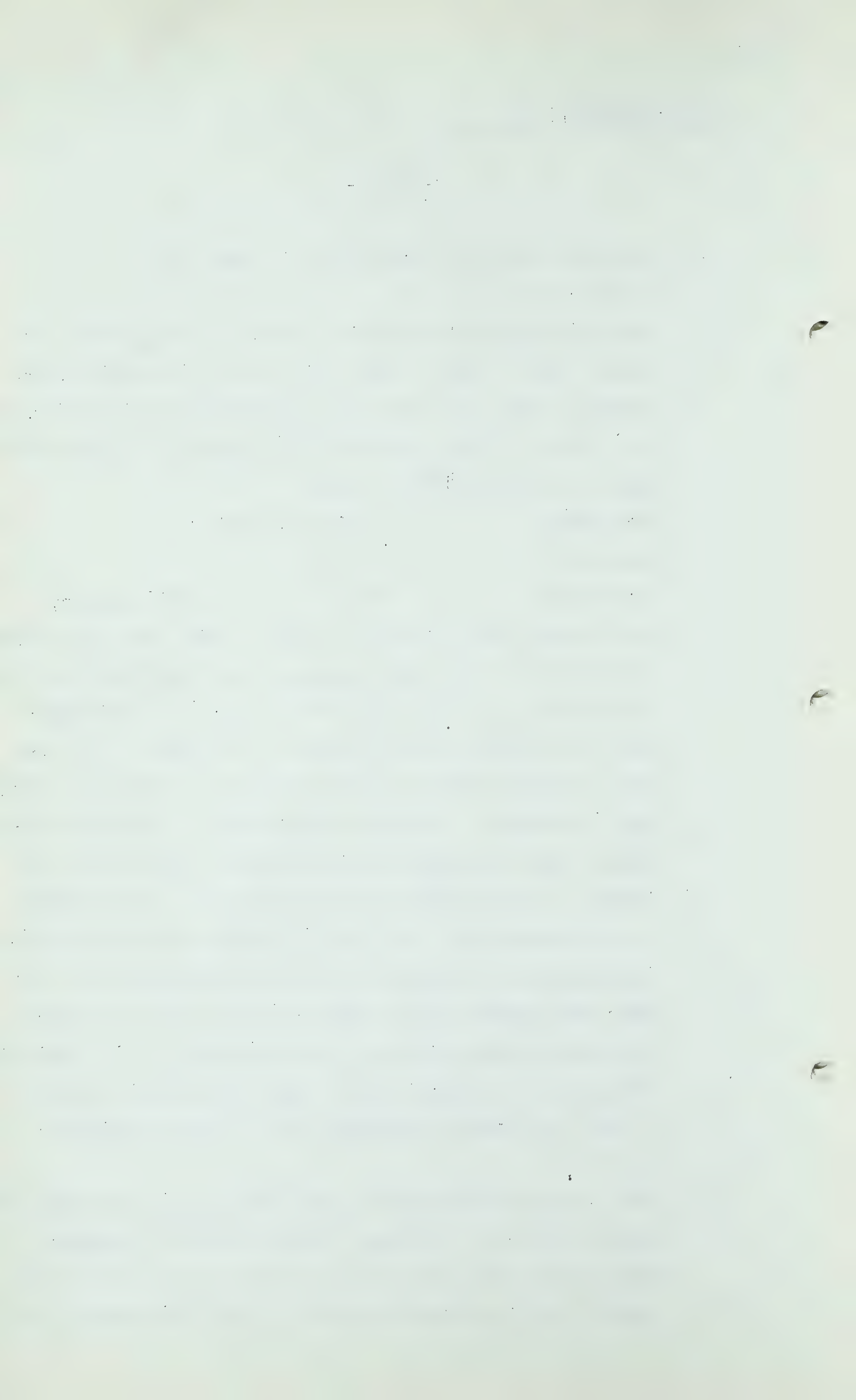
Q DR. GOVIER: Yes. Do you see what I mean, Mr. Brownie, that you state on the one hand that the purchase of Pincher Creek for long-range purposes would in effect be unthinkable, and then on the other hand, if I understand your last statement with respect to conclusion 1, you say that the Pincher Creek reserves should be included in that?

A That is correct. I see no inconsistency in those two statements. They are completely unrelated as far as I am concerned. I say in effect that we cannot buy Pincher Creek at the present time, but I say in addition that Pincher Creek gas should not be exported until those conditions are met.

Q Well, Mr. Brownie, does it mean this then, that you would not consider gas surplus to the requirements of the Province unless there was enough within easy reach of your system to meet the 30-year requirement plus a margin of safety?

A No.

Q Well, perhaps there would be less confusion if we looked at another field, Mr. Brownie. Take Provost for example. Would you consider that as a field that should not at the present time be declared surplus to the requirements of the



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Province?

A Well, depending on the determination of what the proven reserves in the Province are. If the proven reserves are determined to be less than the long range reserves of the Province, I should say Provost should not be declared surplus, in spite of the fact it may be relatively remote from a local market.

Q Let us look at it in this way, suppose the Province's requirements for 30 years were X and the proved reserves within the Province without respect to their geographic location were Y or were 2X, would you say then there would be a volume of gas in the Province which could be declared surplus, even without regard to the geographic location. What I am getting at, Mr. Brownie, is this; Do you want gas reserved for the systems which are close to the systems or is all you are concerned with that there be gas in the Province which is equal to the system's requirements?

A I do not think I care where that gas is, Dr. Govier, if the other considerations suggested here are met.

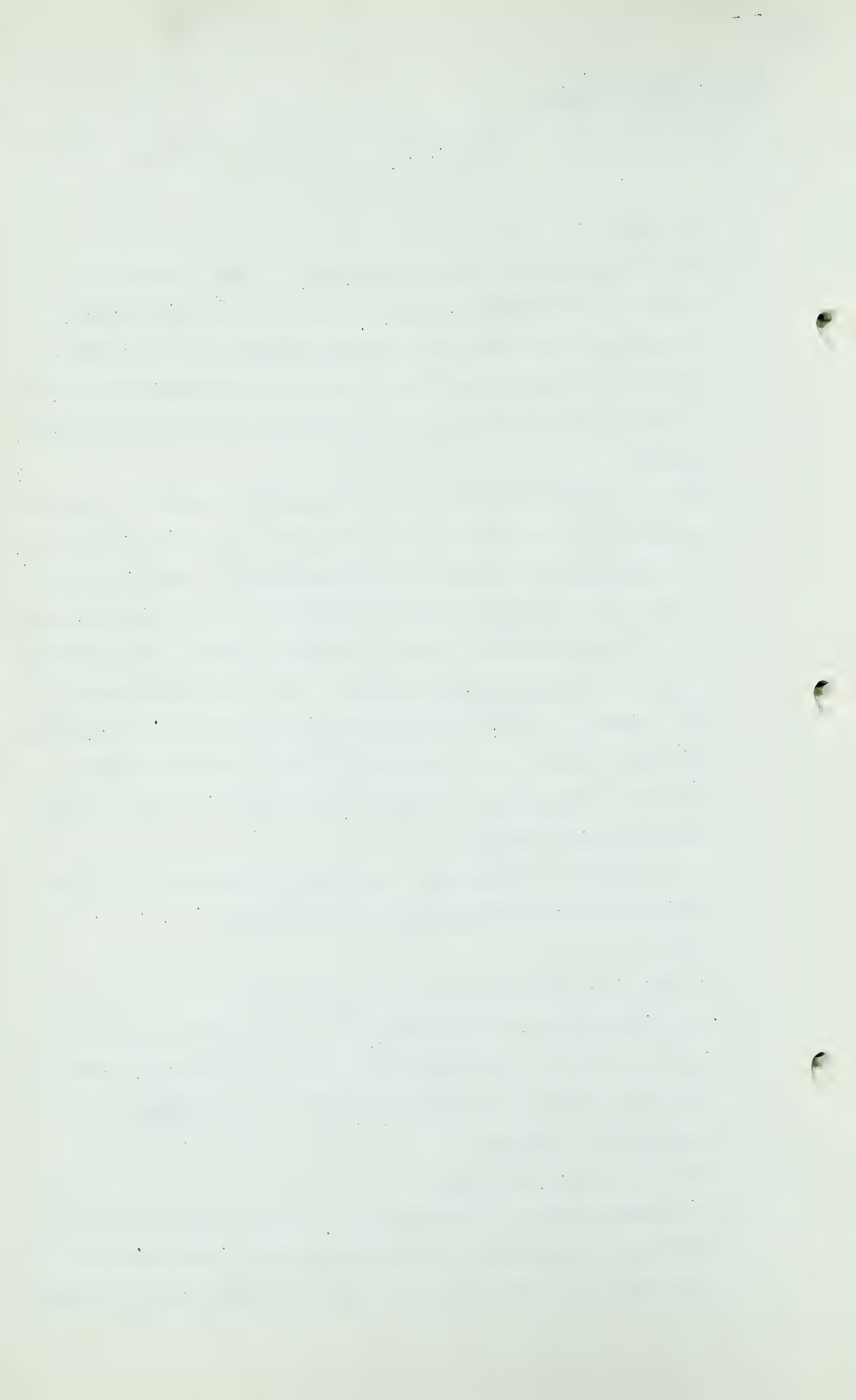
Q I see.

A I hope I made myself clear on that point.

Q Yes, I think I understand the position. In other words, it would be through the application of points 3, 4 and 5 that you would get the protection you require with respect to geographical location?

A That is correct, sir, yes.

Q And perhaps that is the answer to this next question too, but would you tell me if in connection with your point 2 it would be your thought that the export permits would be issued



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for gas in designated fields or not?

A Well, I think it would be preferable from our point of view if they could be issued in respect to designated fields remote from our systems. But again, if those other requirements are met, I am not sure that it makes too much difference.

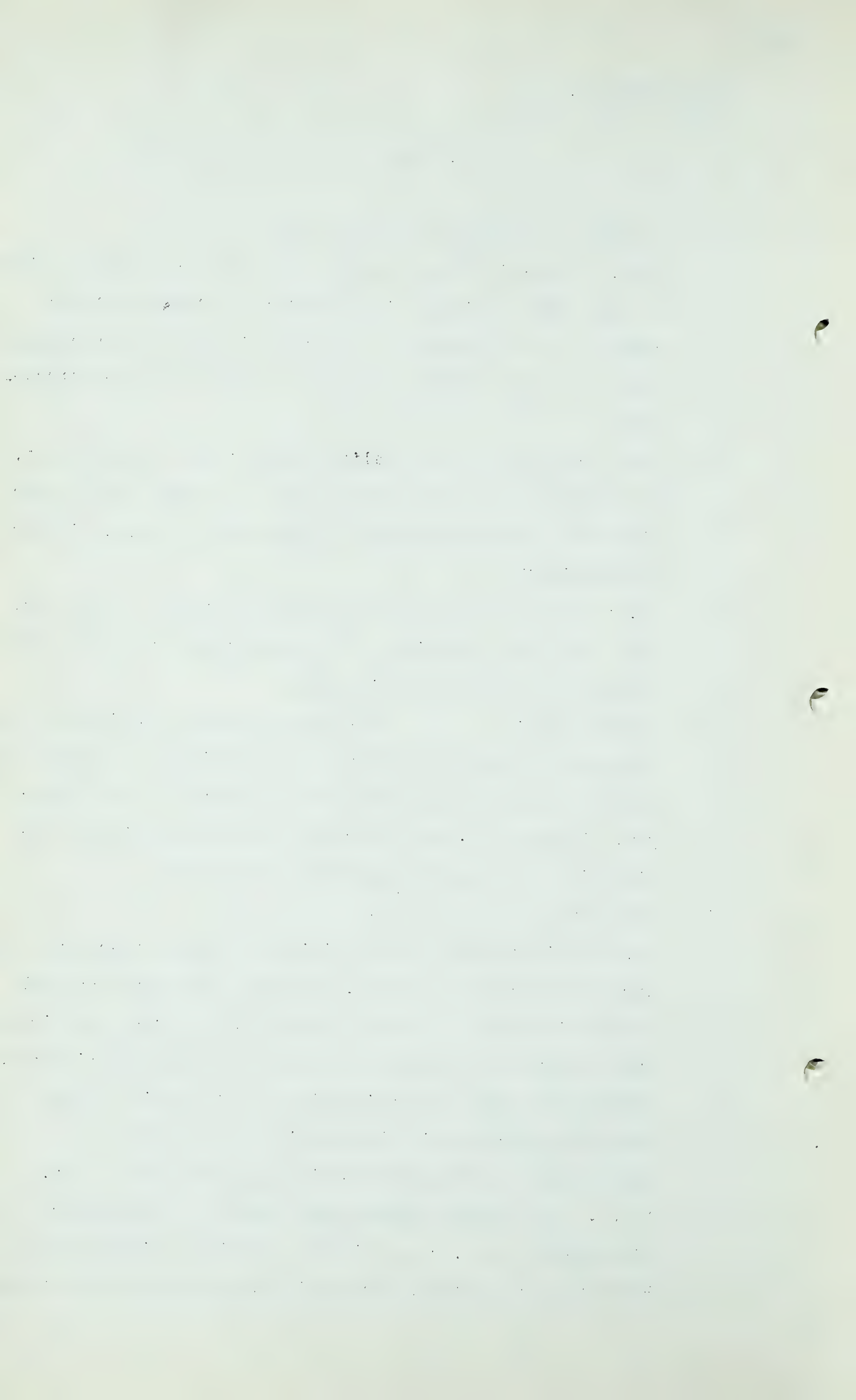
Q And I know you did not qualify yourself as a legal expert, Mr. Brownie, but could you indicate to us what was in your mind when you said in item 3, "Some form of legal, binding undertaking"?

A No, I am not able to be too specific on that. As you say, that is a legal question. It may be that that would have to be done by statute, I don't know.

Q THE CHAIRMAN: Mr. Brownie, while Dr. Govier is on that subject, don't you think the provisions of sections 42 and 45 of the Oil & Gas Resources Conservation Act protect you? I wonder if you have given any consideration to the Oil & Gas Resources Conservation Act itself?

A I do not recall those, no.

Q 42, "Notwithstanding the provisions of any contract or arrangement relating to gas, the Board, with the approval of the Lieutenant Governor in Council, by order, may direct that the owner or operator of any well or the proprietor of any gas pipe line, scrubbing plant or absorption plant, named and described in the Board's order, shall. . . ." and it goes on about constructing pipe lines and so on, ". . . sell the gas gathered and treat it in accordance with clauses a, b, c or d in the quantities fixed by the Board to such wholesale or retail marketers or users of gas



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"as the Board directs from time to time."

A Well, from my very rudimentary understanding of the legal situation, Mr. McKinnon, it is my understanding that once a well within the Province is connected to a pipe line running outside the Province that control of the gas at that well may not be retained by the Province under existing legislation.

Q Section 75 is along the same lines, and I believe the Board has certain powers under section 47, notwithstanding contracts. But you have not given any consideration to those provisions of the Oil & Gas Resources Conservation Act at all?

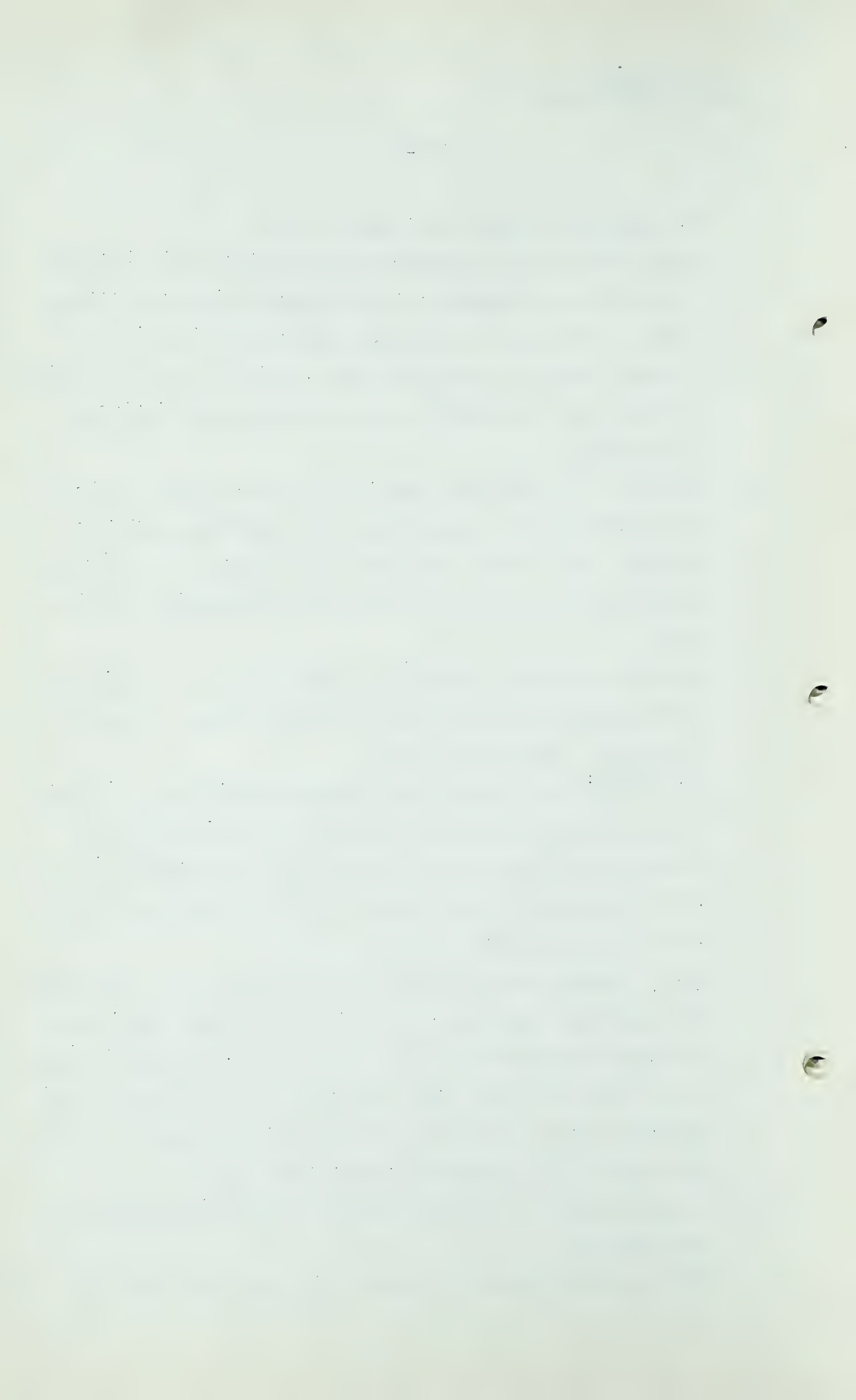
A My last answer was general. It will apply, as I understand, to Provincial legislation as presently set up. I may be completely incorrect in that.

DR. GOVIER:
Q Am I right, Mr. Brownie, in interpreting this legal binding undertaking as something apart from the condition of an export permit issued under the Gas Resources Preservation Act, it is something different than a condition the Board might include in the permit?

A Well, I would prefer something more positive as a protection for local use than just a condition in a permit under which a local user would have to go to the Board, such as it might be at that particular time, and request that the local user be given priority over some export market. I have in mind the necessity of something stronger than that.

Q As for example a contract between the exporting company and your company?

A That would be one way of doing it but that does not look



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after other prospective users in the Province.

Q Are you able to help out any further, Mr. Brownie, by suggesting a method whereby this legal binding undertaking could be fulfilled?

A No, I cannot, Dr. Govier.

Q I notice you suggest in the end of item 3 that it might be appropriate to add a factor to the Board's estimate?

A Yes.

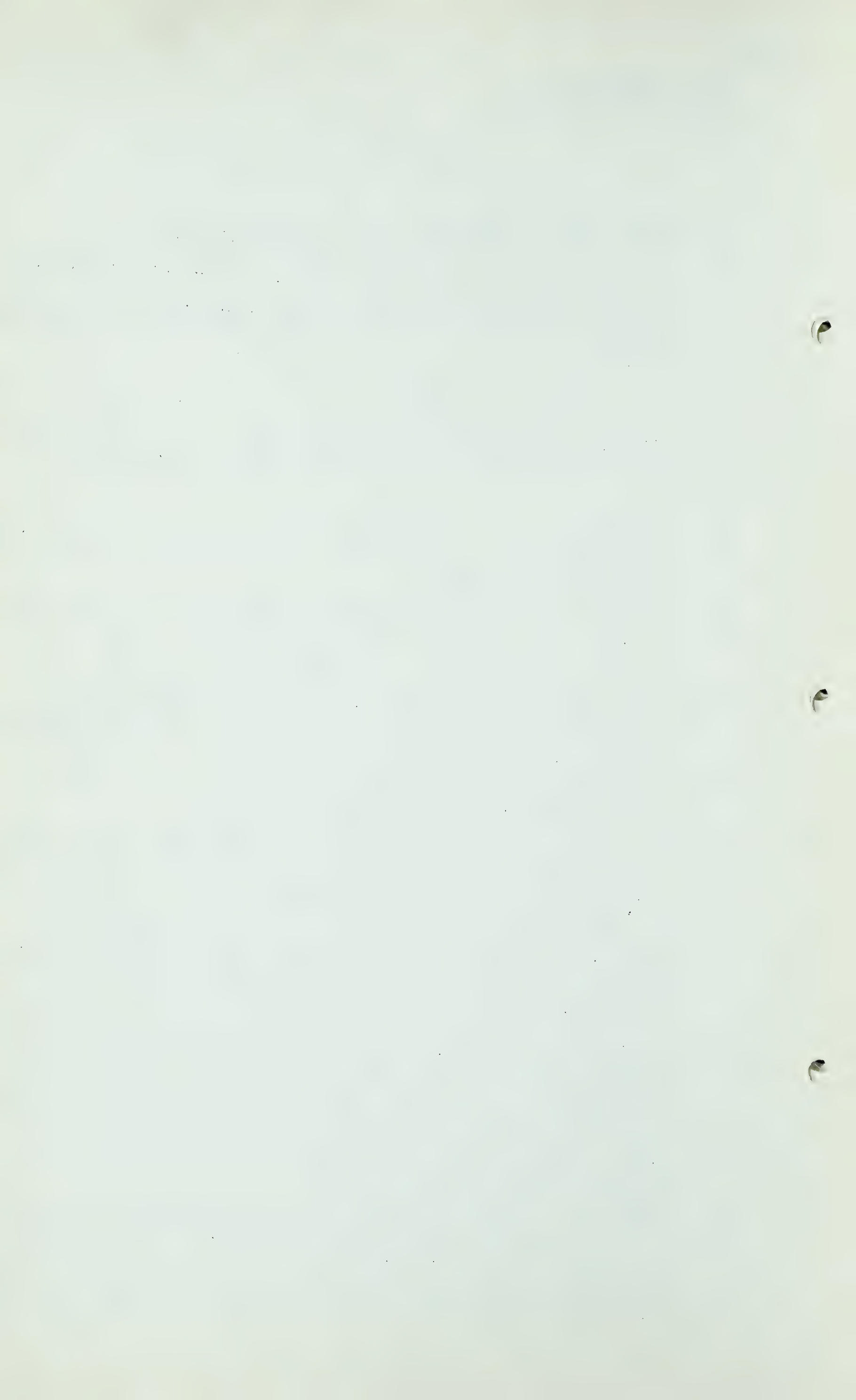
Q Would you care to elaborate and perhaps suggest the size of this factor of safety?

A Well, it would have to be purely arbitrary. You would just have to pick a figure. You might pick 25% or 50%.

Q With respect to conclusion 4, is it your thought that this protection, again, should be provided in a manner different than as a condition of the export permit, or could that be done by a condition of the export permit?

A No. There again I think it would be preferable to have something stronger. In the first place I think we would have to be careful that the conditions in the export permit would stand, just as we have to be careful that the present statutes are good, and furthermore, I would prefer to see something of a commitment, legal binding commitment, on the part of the exporter that would not leave the local user subject to rulings that might be made at the time. I find it difficult to say that, with all respect to the Board, but there might be a different Board 15 years hence.

Q Would you turn the page, Mr. Brownie, and look at Number 7? You use the expression "useful gas fields." I wonder if you could tell us just what you have in mind there, that is, with



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the pooling, either actual or assumed, of all useful gas fields?

A Well, that term is somewhat difficult to define, Dr. Govier, but I have it in mind you could find gas shows anywhere in the Province, practically, and consideration does not have to be given to areas where the wells are so small or so remote, or for other reasons are not economically useful.

Q That is the definition "useful" would involve, geographical location, pressure, load factors?

A That is correct, many factors.

Q There is a sentence at the end of item 7 that I have been unable to completely understand, "This arrangement could also be used to provide fair treatment for useful fields that for economic or other reasons remain temporarily unconnected to any markets." Would they still be useful fields if they fell in this category?

A Well, you might have a situation, Dr. Govier, where an export pipe line tapped one field and paid a very high price, and an exporter was quite happy with that one field, it was all he needed, but it was still somewhat cheaper for him to take all his gas from that field rather than build a pipe line to a second field and share the market between those two fields.

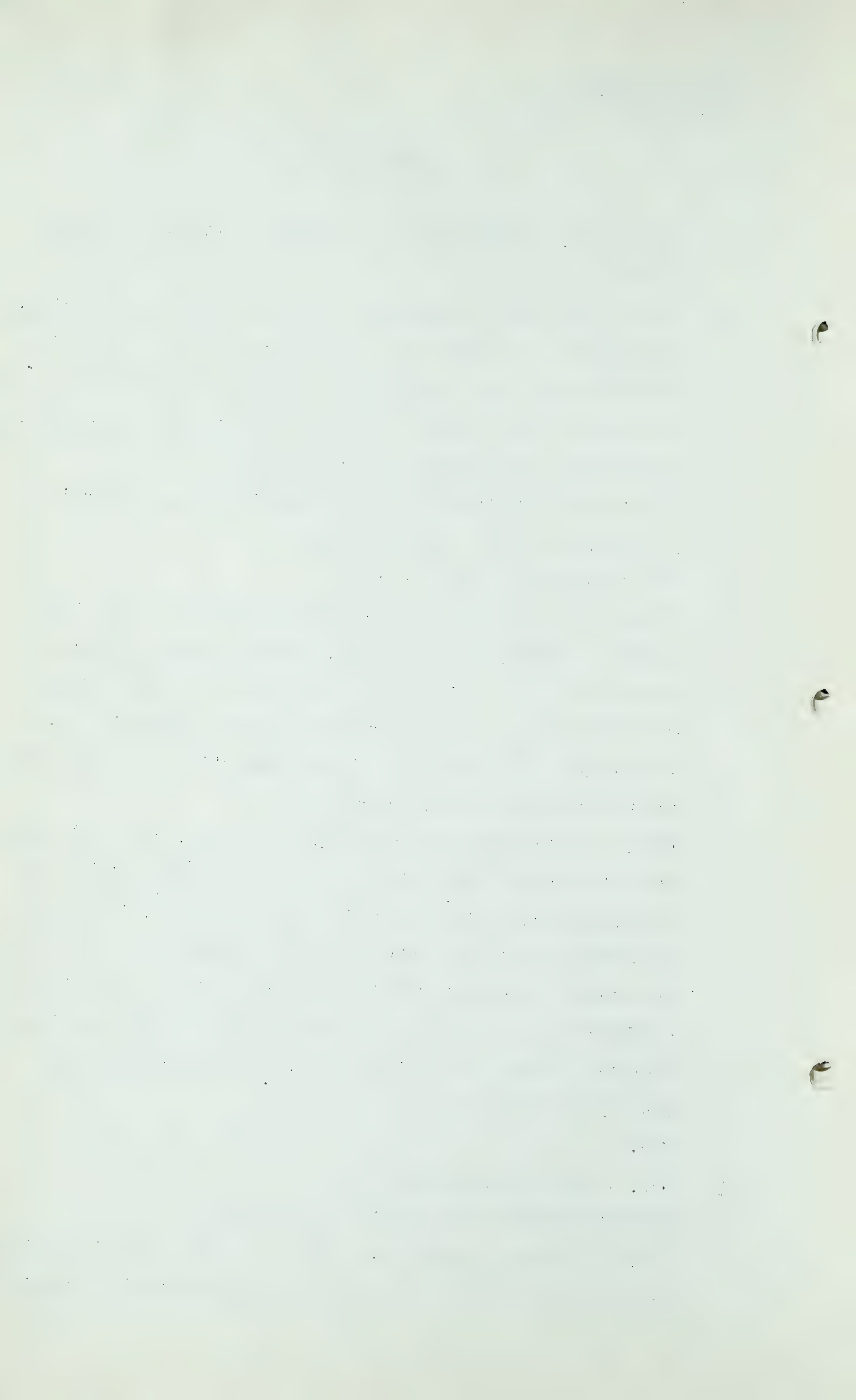
Q That is a second field within reasonable distance and of reasonable size and so on?

A Yes.

Q Yes, I see what you mean.

A Does that answer the question, Dr. Govier?

Q Yes, I think so, thank you. There is still one other thing, Mr. Brownie, that I still do not quite understand. Is this



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right, that as far as your company is concerned, you take the position that until such time as there are in the Province proven gas reserves or established gas reserves equal to the 30 year requirement of the Province, plus a margin of safety, that no gas field in the Province, regardless of its location, should be declared as surplus to the requirements? Suppose, for example, we had a field right up in the northeast corner of the Province, and we still did not have a Provincial total that would meet our 30-year requirements, would you still be reluctant to see that distant field declared surplus to our requirements?

A I would still be rather reluctant, Dr. Govier, but I would feel less strongly about a field at 300 miles away than I would about one 200 miles away or 150 miles away.

Q It would be a matter of degree in your opinion?

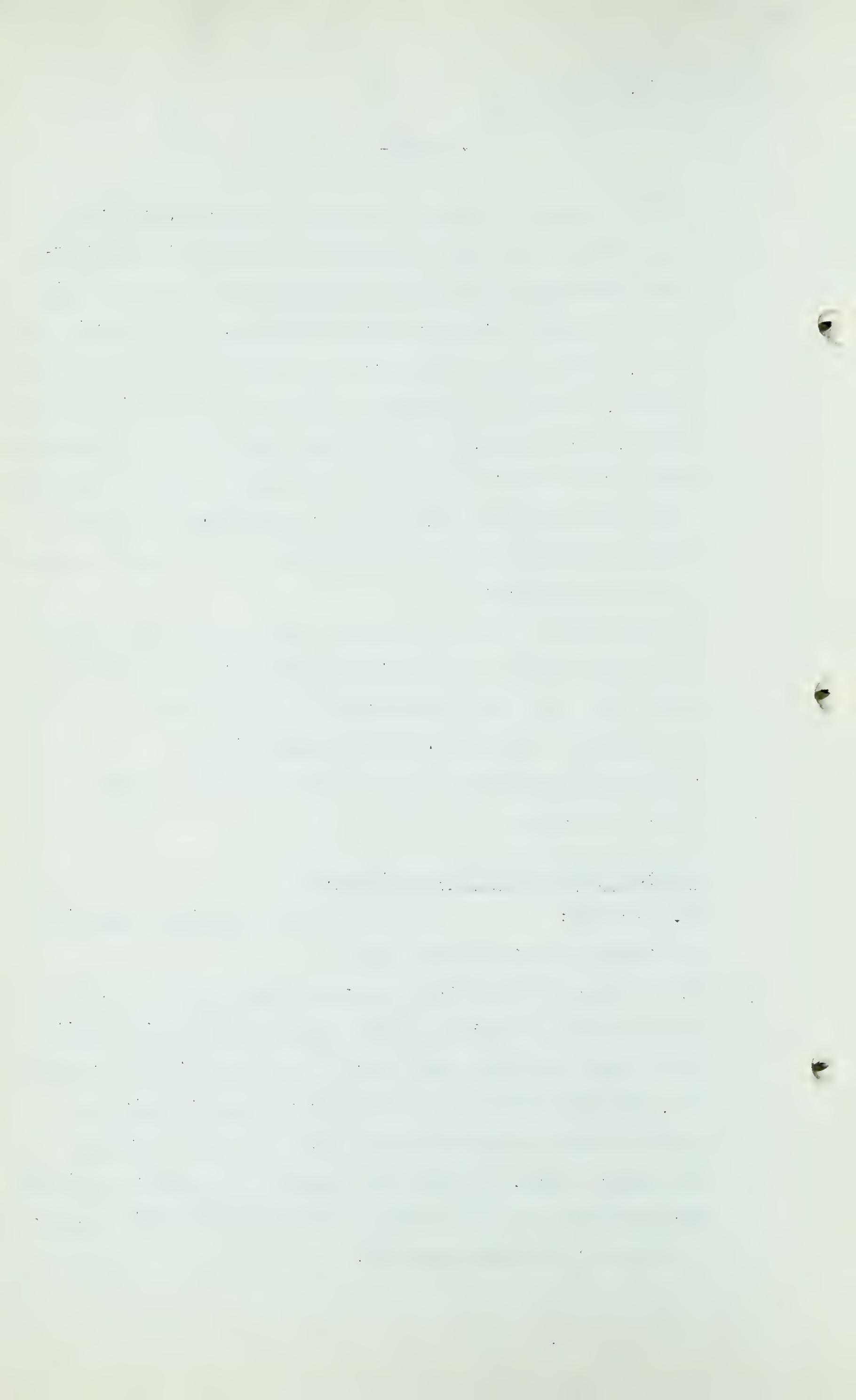
A I think you would have to give that some consideration.

Q Thanks very much.

CROSS-EXAMINATION BY MR. McDONALD:

MR. McDONALD: Mr. Chairman, if I might deal with one item Dr. Govier brought out.

Q Turn to page 23, the first paragraph commencing there, the last sentence, "A substantially greater increase in retail rates than this might well result from unrestricted export." Now, will you just tell me how export of gas is going to have an effect on increasing the rate that your companies are going to pay, just for the record. It has been mentioned many times and I do not think it has been definitely stated. I wonder if you could state it?



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A Well, I have devoted about half this brief to explaining that, Mr. McDonald.

Q Well, now, can you think of any reasons? That is your answer?

A Yes.

Q Well, now can you think of any reasons whereby export would be of benefit to your consuming companies?

A Yes. If there were lots of gas and if we had to rely on fields somewhat remote from our present pipe lines, and pipe lines could carry gas both for export and ourselves, I think that would help out.

Q That would be the main advantage?

A I think that is the main thing, yes.

Q It would increase the supply that may be available to you?

A No. I think the main thing is it might, under certain circumstances, mean more economic transportation of remote reserves to our system.

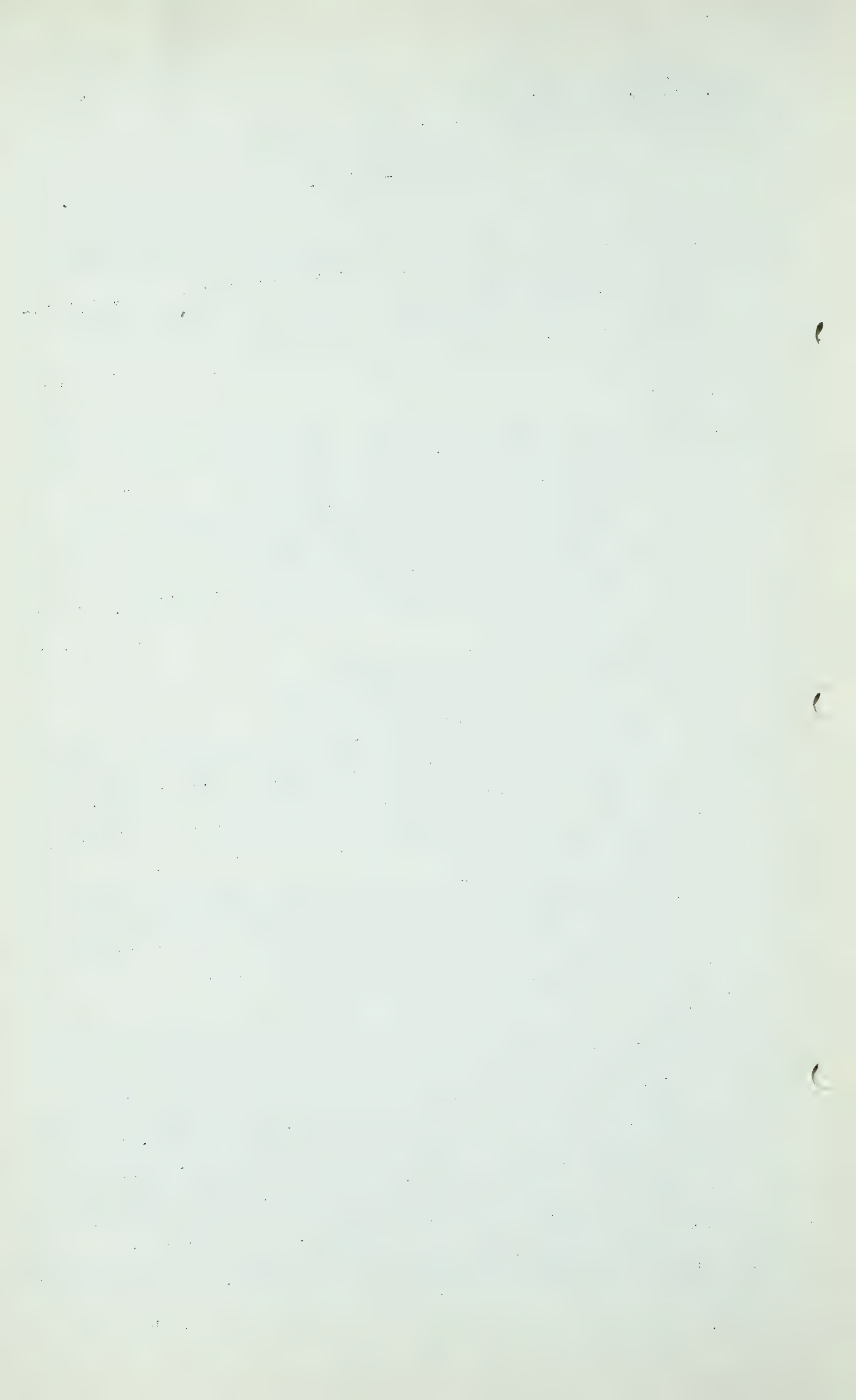
Q Now, then, would you agree with me that there are a great many other things which might or maybe are now increasing the price of gas to the consuming public?

A Yes.

Q Bearing in mind particularly the price of gas at the field. Specifically what I have in mind is this, Mr. Brownie, as I recollect the history of the Northwestern Utilities system the company acquired some 60 billion feet of reserves and a number of producing wells for about \$230,000.00 originally.

A I don't remember that, Mr. McDonald, I am sorry.

Q Well in the last few months you have applied for and obtained



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more increases in order to provide some \$900,000.00 to acquire gas from this development in the Legal area, isn't that right?

A We had a rate increase in the Northwestern recently amounting to a figure of about that order, but it was not for the specific purpose of gas from the Legal area.

Q Wasn't the \$900,000.00 set up in your rate base for that specific purpose?

A No.

Q How much was set up?

A I do not think anything was put in for estimates for that exploration. We did not put anything in for that, Mr. McDonald.

Q Then what are you charging? The work you are doing you are charging to operating expenses?

A Well, it depends. The dry holes presumably will be but the successful wells will be capitalized.

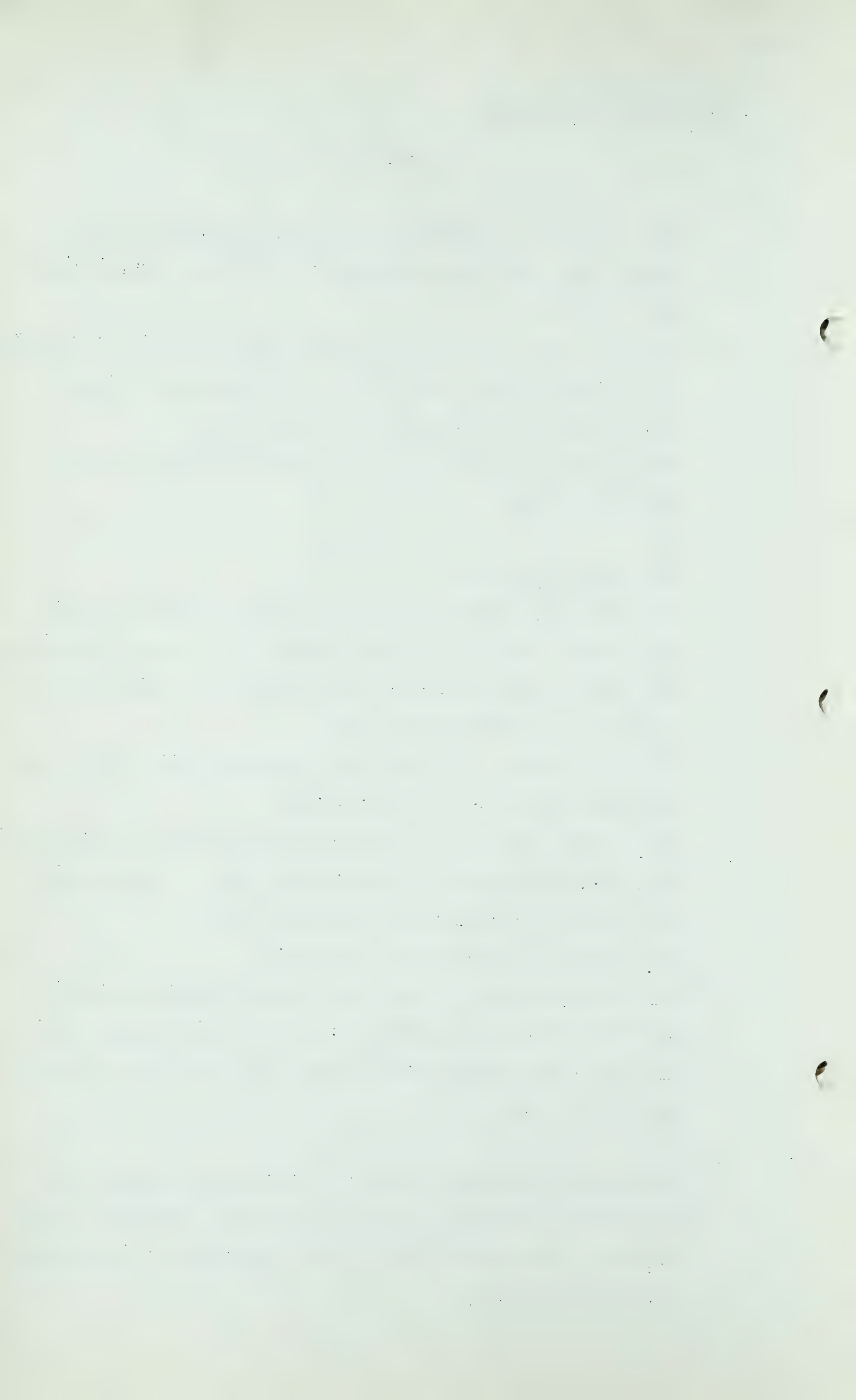
Q Now, do you expect to get the gas from those particular holes at a price comparable to that in which you are now getting gas from the Viking-Kinsella field per Mcf?

A No, I think it would be more expensive.

Q What I am getting at is that the present consumer cannot look back 20 years ago and say: "I was paying so much for gas then" and continue into the next 20 years and only pay so much for gas?

A No.

Q You are not suggesting in this brief that that is the type of price that you wish to maintain for your consumers, that is to say there shall be no increase whatsoever in the price of gas in Alberta?



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A No, I am not suggesting that.

Q Do you think some of your consumers might have that in mind when they are thinking about export?

A They might.

Q Well, can you enlarge on it? I mean, is that the viewpoint that has ever been expressed to you by any considerable number?

A No. I would be glad to answer your question, Mr. McDonald, but I am just a little puzzled as to what you mean.

Q Are you suggesting here that the price of gas to the Northwestern Utilities' system and the consuming public should remain where it is now, 10 $\frac{3}{4}$ cents?

A No. I recognize there are numerous factors which might cause it to go up and some which might cause it to go down, I don't know. I am just suggesting in our submission one of the factors contributing to an increase in price should not be export.

Q And that is the submission you are now making to the Board?

A Yes.

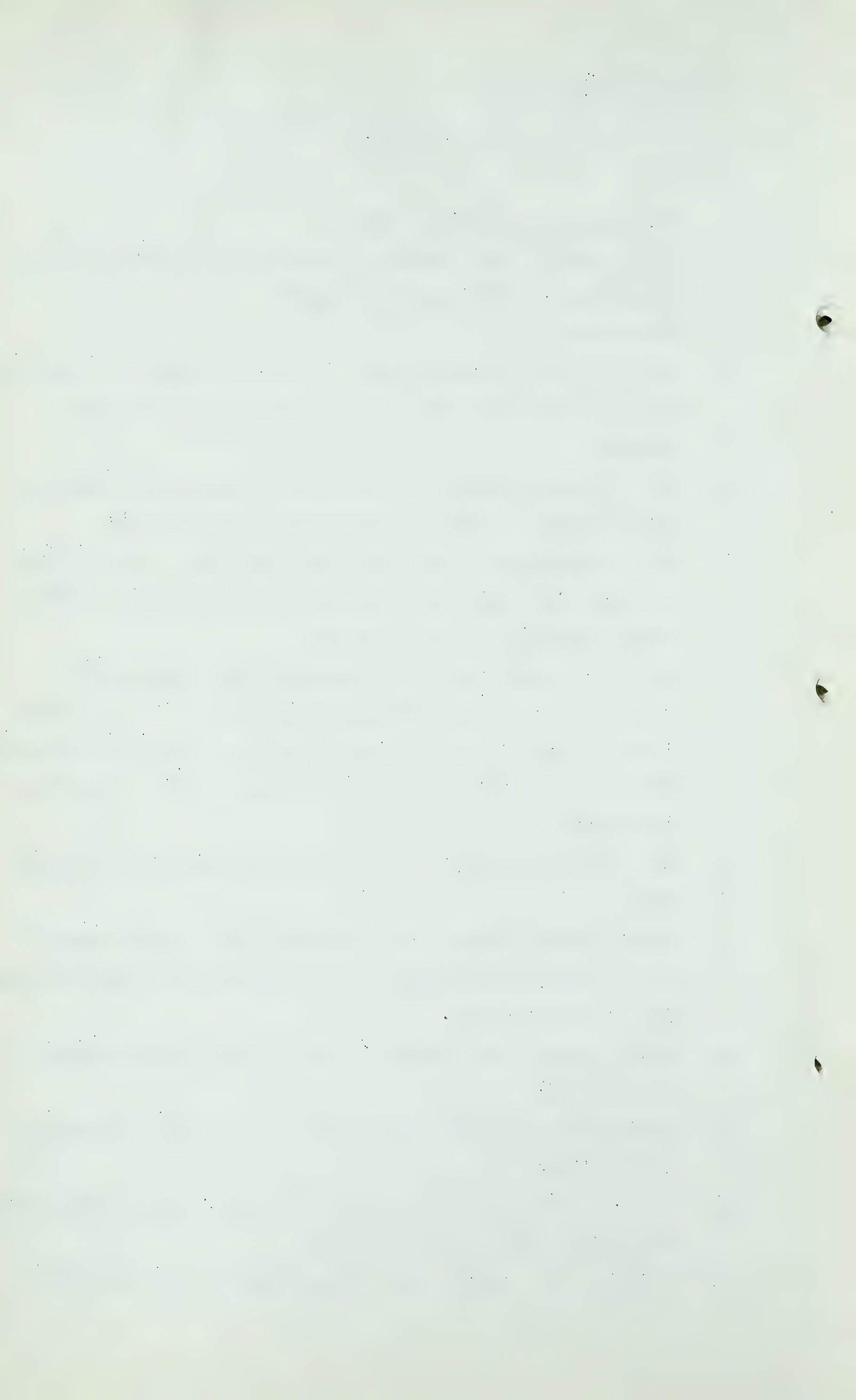
Q Now if other factors were introduced into the operation of your company which resulted in an increase that your companies have to pay for gas . . .

A Talking about our companies' costs, or the field price we have to pay?

Q That you would have to pay. We are only dealing here with field price.

A Well, we will have to face it if there are other factors that would cause that price to go up.

Q You would not suggest just because export is granted that



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this 10 $\frac{3}{4}$ cents will forever be maintained?

A No.

EXAMINATION BY THE CHAIRMAN:

Q Mr. Brownie, I wonder if you would mind looking at page 17, number 2 at the bottom of the page. Do you consider that the provisions of the Pipe Line Act do not afford any protection to proving uneconomic duplication of pipe line facilities?

A I think they do, Mr. McKinnon.

Q On page 19, Mr. Brownie, item 3, you question the spending of risk capital in search for gas only and the matter of utilities employing their capital that way. Well, now, will you consider it proper expansion that the utilities should develop gas strikes?

A Yes.

Q Have you any other project in mind?

A You mean to follow up an existing gas strike?

Q Yes?

A We have the Legal one which has been referred to with a southerly extension amounting to about 14 square miles, and we have a commitment to another one east of Edmonton.

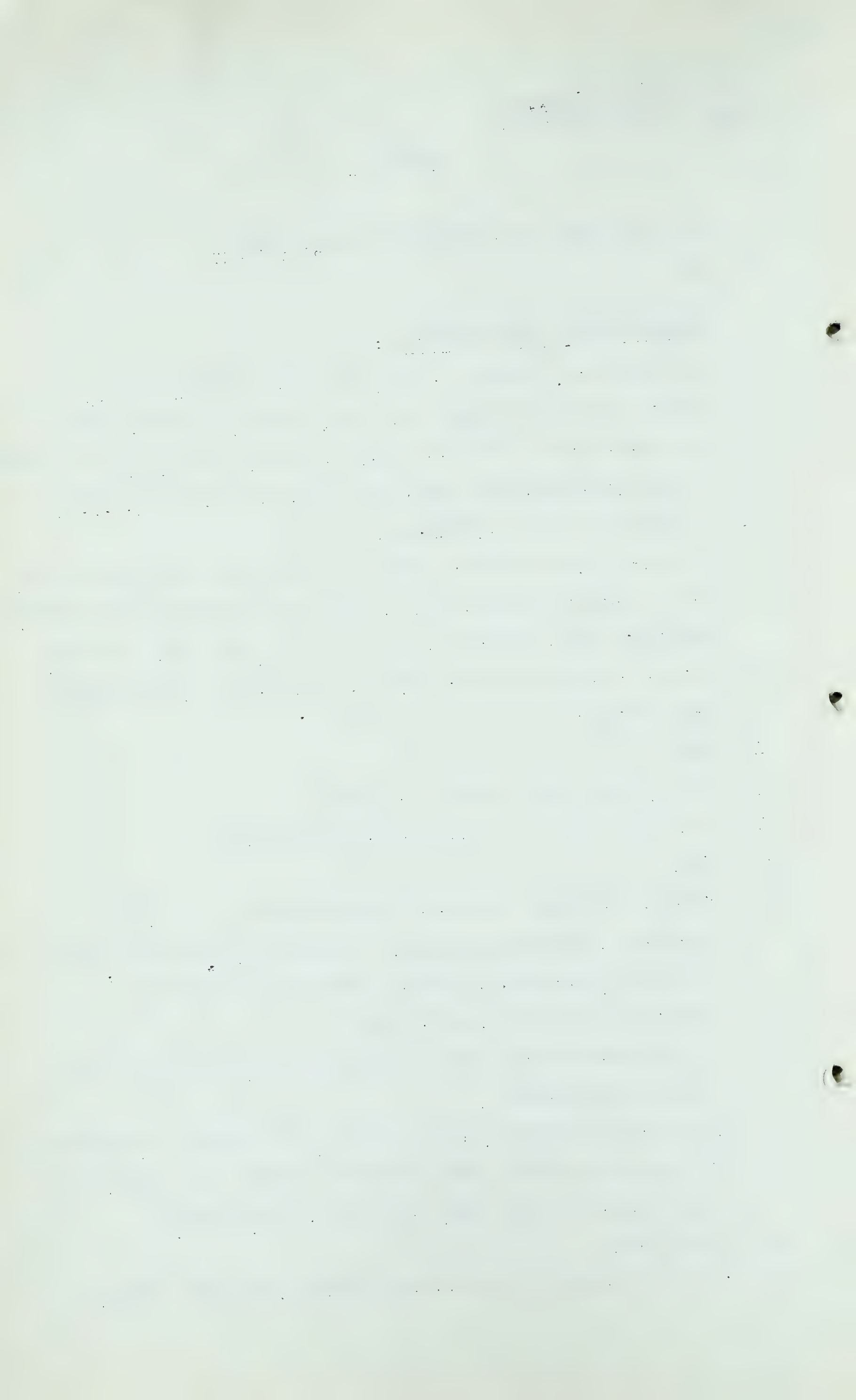
Q That is all that you have in mind?

A We have more in mind but they are not developed beyond that point at the moment.

Q At the top of page 20, item number 6, Mr. Brownie, what fuels did you have in mind there where you thought the competitive margin was not very large? Did that include coal?

A I am sorry.

Q "In these cases the competitive margin with other fuels is



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not wide," talking about industrial consumption?

A The reason I hesitated, I suppose all I really had in mind was coal.

Q You did not consider oil at all?

A No. I cannot say that I have examined that situation recently.

Q At the top of page 22, Mr. Brownie, you make the statement, "If gas is to be exported unconditionally," do you think any permit that would be issued for export would not have any conditions attached to it?

A No, sir.

Q You do not think that?

A No. Did you say "would have"?

Q In other words, you think the permit would have conditions?

A Perhaps I did not understand your question.

Q I say, would you think any export permit would have to be issued without having any conditions attached to it?

A No, I would not think that for a moment, no.

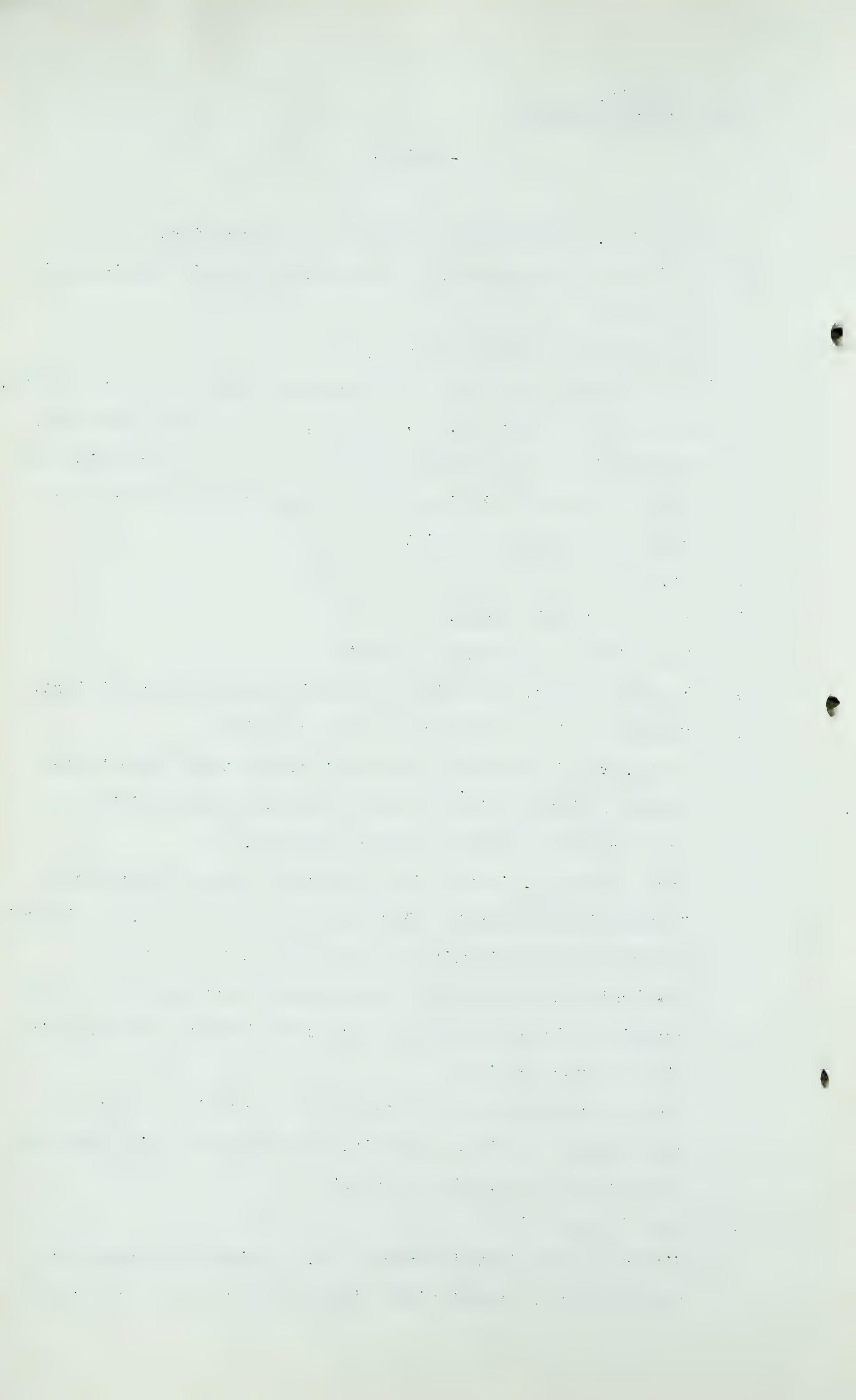
Q And on page 23, in the first paragraph there, you refer to "unrestricted export". What did you mean by that, Mr. Brownie?

A Export under permit without conditions attached to it. Mr. McKinnon, I am simply developing an argument here and I certainly did not intend to insinuate that the Board had in mind any such action.

Q You deal at the present time with the provisions that the Board might attach to a permit, that the Gas & Oil Resources Preservation Act would not hold?

A That is my advice.

Q With regard to item 10 on page 25, I think you referred to this matter of useful fields being a fair share. You cited



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an example of where an export permit, the holder of an export permit, could take all his gas from one field?

A Yes.

Q And leave a neighbouring field without any market at all?

A Yes.

Q You do not think the provisions of sectionn 40 of the Oil & Gas Resources Conservation Act with regard to common purchaser would enable to the Board to force the exporter to give the other pool a share in the market?

A Mr. McKinnon, I think I am getting out of my depth on this legal question.

Q Well, it is not a legal question. It is a matter that there is provision here for market sharing, you might say.

A Well, I aporeciate that, and I think, apart from the legal question, that would cover it.

Q You mean the legal question as to whether we could enforce that provision of the Act?

A Yes.

Q I think that is all.

CROSS-EXAMINATION BY MR. S. B. SMITH:

Q I have a few questions I would like to ask, if I may.

Mr. Brownie, am I approximately correct in suggesting that the gas fields which your companies have developed in this Province are the Viking-Kinsella and the Bow Island field?

A And the Foremost, apart from this exploration north of Edmonton we have been talking about.

Q The one that is currently going on?

A Yes.

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Q And you had nothing to do with the development, for instance, of Pincher Creek, Princess, Patricia, Countess, Medicine Hat, those areas?

A That is correct.

Q And you say that it is unthinkable that the Canadian Western Company should purchase the Pincher Creek field?

A Yes.

Q I suppose it would almost follow that it is unthinkable that the Canadian Western Company would purchase the Medicine Hat field, Princess, Countess, Cessford fields, isn't it?

A I would think so.

Q Other fields that were all developed by other people, with money from other people than the Canadian Western Company?

A Correct.

Q And it is quite obvious people drill oil and gas wells and get their money back, apart from the money they invest at a risk?

A I would think so.

(Go to page 2731.)

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Q So there is not much incentive, Mr. Brownie, certainly, to drill for gas in large parts of this Province if the person who drills the well cannot sell the gas within the Province, because it is not economically feasible for the Canadian Western Company or Northwestern Utilities to buy the field or the product of the field, and if the person who finds that gas and risks his money in finding it cannot sell it to anyone, then there is not much incentive in that kind of business?

A Apart from the hope of being able to sell it. . .

Q Some time?

A . . . to others inside of the Province or even outside of the Province.

Q Maybe some time?

A That is correct.

Q Is that the kind of incentive that you would want to risk your money on? It is doubtful, isn't it?

A That is a very difficult question, Mr. Smith. I think I may risk a little money in it, if I had any.

Q I think that is a pretty good answer. It is pretty indefinite too, isn't it, Mr. Brownie? Well, Mr. Brownie, do you think you can expect people to go on investing risk capital in an endeavour to find gas if there is not any market for the gas? You cannot expect them to do that indefinitely, it would be very foolish, wouldn't it?

A You might expect them to invest in the hope of getting a market.

Q Yes, but it has to be a reasonably near hope in the point of time, surely, doesn't it?

A Yes. I would say the controlling factor, Mr. Smith, in

F.A. Brownie,
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that regard, the controlling factor as to the market, I take it, from what I understand of the Government's policy and the Board's policy, in that respect, is that a certain quantity of gas shall be uncovered.

Q Yes. Now, Mr. Brownie, I think you would say that you are optimistic as to the future of Alberta in respect to oil and gas?

A Yes.

Q Do you think, potentially, that we have great resources in this Province? You think so, do you not?

A Yes, sir.

Q Potentially?

A Yes, sir.

Q You have very strong hopes in that regard, and a good deal of confidence, haven't you?

A Yes.

Q And to develop those presently undeveloped resources, you have to have an incentive, don't you?

A That is correct.

Q And it is at least possible that the export of gas may provide a very considerable incentive for the exploration for gas? It would, wouldn't it?

A It would have some effect.

Q A very considerable effect, likely, wouldn't it?

A No, I do not think so, Mr. Smith.

Q I see?

A I do not think it is large, for instance, in relation to the possibility of finding oil. I think that is a greater incentive.

Q Well, to people around here, some of them, it is quite an

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Cr.Ex. by Mr. S.B.Smith

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interesting subject, this question of the gas?

A Yes.

Q And if there is an incentive and more exploration and more gas is found, in substantial quantities, would you agree that it is good for the people of Alberta, for the companies that you represent, as well as for the people who do the drilling?

A Well, that depends entirely on the relationship between the amount of gas found and the requirements of the Province, the people of the Province, and the exporter.

Q But if the results are encouraging, the results would be good for you and for the people of the Province, wouldn't they?

A I do not understand what you mean by that question.

Q Well, if there is more incentive and more drilling, and there is more gas found, in substantial quantities, it cannot hurt your gas companies any, can it?

A No.

Q It would not hurt the people of Alberta, would it?

A No.

Q No?

A That taken by itself.

THE CHAIRMAN: That is all, thank you, Mr. Brownie.
Mr. Martland, do you think it is worth while starting with you?

MR. MARTLAND: So far as my personal preference is, I prefer not to go on, Mr. Chairman, but in order to save time I would put a witness in, but I do not think that he would finish before adjournment time.

THE CHAIRMAN: In that case, I think we will adjourn

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and let you start on Monday, Mr. Martland.

MR. MARTLAND: Thank you.

THE CHAIRMAN: We will adjourn until Monday morning.

(Hearing adjourned until 9.30 A.M., December 10th, 1951)

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and income state as follows, Mr. Bartland,
Mr. Bartland, Mr. Bartland, Mr. Bartland.

THE CHAIRMAN: We will adjourn until Monday
morning.

(Meeting adjourned until 9.30 A.M., December 10th, 1941)

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The Province of Alberta

PETROLEUM AND NATURAL GAS CONSERVATION BOARD

Application for Permission to Remove or cause to be removed
Natural Gas from the Province of Alberta, under the Provisions of the
Gas Resources Preservation Act by Prairie Pipe Lines Limited.

I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

Session:

Volume_____

